CEJISS

CENTRAL EUROPEAN JOURNAL OF INTERNATIONAL AND SECURITY STUDIES

Contents

Volume 17, Issue 1, March 2023

Iran's Nuclear Policy: A Cognitive Study on Defiance and Compliance

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Abstract

This paper argues that the divides in Iran's nuclear behaviour between the three periods of 2005-2012, 2012-2016 and 2016-2021 are reflections of the varying modes of Iran's cognising the value of the nuclear program versus its costs. The predominant belief in the first period that Iran is in the gain domain made it defiant and risk-averse leading to Iran's avoidance of entering a pact with the untrusted US. The change of belief that Iran moved to the domain of losses as a result of sanctions drove Tehran more risk-taker and compliant in the second period and a part of the third period. This resulted in conclusion of the nuclear deal and the efforts to maintain it. While suffering in the domain of losses, the belief that another deal with the US is a predetermined failure explains the rest of the third period's Iranian fluctuation between compliance and defiance.

Introduction

Iran's foreign policy during Ahmadinejad's presidency, particularly his first term, was formulated around resistance against US pressures. Ahmadinejad vehemently called for standing up in the face of all US pressures, out of his belief that advancement of the nuclear programme is Iranians' inalienable right (Fathi &

Slackman 2007). Before Ahmadinejad, Rouhani who was then Iran's chief nuclear negotiator, had come to the conclusion that the 'European Union is after prolonging of negotiations without having an intention to recognize Iran's rights' (Rouhani 2012: 583) and therefore negotiation and interaction with the European troika had subsided, giving room for more concentration on completing the nuclear fuel cycle and enriching uranium inside Iran. Referral of Iran's nuclear dossier to the United Nations Security Council (UNSC) in February 2006 and adoption of several resolutions against Iran could not hinder development of the nuclear programme. In reaction, the US convinced the European countries, India, the Southeast Asian states, China and Russia to effectively implement the anti-Iran UNSC resolutions (Koulaei & Soltaninejad 2014). International pressures made Iran shift towards more serious negotiations over the nuclear issue in a way that in 2012, for the first time, ignoring the UNSC resolutions was replaced by one-on-one talks with the US (Cooper & Landler 2012). These negotiations reached momentum by a victory of Rouhani in the presidential elections of June 2013 and resulted in the signing of the interim agreement on Iran's nuclear programme in Geneva in November of that year and the Joint Comprehensive Plan of Action (JCPOA) in 2015. But the heady days of the nuclear deal did not last long. Even before Obama's term was over, critics began to attack the deal in the United States. The attacks were intensified during the campaigns of the 2016 presidential elections when Donald Trump condemned the deal with the aim to undermine his liberal opponent's foreign policy agenda. He called the nuclear deal 'an embarrassment and one of the worst and most one-sided transactions the United States has ever entered into' (White House 2018). Not long after he took office, Trump started to take practical measures against the deal to defuse it. These measures were a prelude to the actual withdrawal of the United States from the JCPOA in May 2018.

Iran did not respond by reversing its cooperative course or restoring its pre-deal nuclear status. Instead, Iran's then president, Hassan Rouhani, declared that 'Iran would remain in the nuclear deal without the US presence' (Press TV 2018). For a year, Iran adopted a policy of strategic patience based on working with the remaining parties to the deal, during which time Tehran, in the words of ex-foreign minister Mohammad Javad Zarif, 'remained fully committed to the agreement and gave Europeans the opportunity to fulfil their undertakings and make up for Washington's exit' (Tasnim News Agency 2019). Only after the European powers proved unwilling or unable to live up to their commitments and when Washington sought to zero Iran's oil sales from April 2019 onward (DiChristopher 2019) did Iran declare that it would enrich uranium beyond the limitations set forth in the nuclear deal (Rasmussen, Norman & Eqbali 2019). However, Iran did not consider this a violation of the deal. Zarif regarded the rolling back in

Iran's commitments in harmony with the nuclear deal which holds the right for any party to the deal to reciprocate in case other parties fail to live up to their commitments (Radio Farda 2019).

After the US assassination of the Iranian general Qasem Suleimani in January 2020, Iran declared that it is 'no longer abiding by a commitment made under the 2015 nuclear deal and would not limit its enrichment of uranium' (New York Times 2020). Despite this, Tehran remained within the outlines of the deal and allowed regular inspections to be carried out by the International Atomic Energy Agency (IAEA) (Siddiqui 2020). Moving towards the end of Rouhani's presidency and the beginning of conservative Ebrahim Raisi's tenure, Iran pushed harder to build on its leverages against the US's continued sanctions by limiting access of the IAEA inspectors to some nuclear facilities (Norman 2021), and also by increasing uranium enrichment degree to 60 per cent (Reuters 2021). Simultaneously, Iran engaged in negotiations to return to full compliance to the deal (Erlanger & Sanger 2021). Raisi, who shares a principlist foreign policy approach with Ahmadinejad, respected the goal of reviving the JCPOA and expressed his government's intention to return to the nuclear talks (Davenport, Masterson & Kim 2021). Yet, Raisi's approach towards the deal is characterised by sending mixed signals (Lotfy 2021). On the one hand his foreign policy team express readiness to revive the nuclear deal and on the other hand they walk back the prior arrangements reached during the six rounds of negotiations between the 4+1 (with the indirect involvement of the US) and Iran under Rouhani, raising speculations that the JCPOA will remain in a comatose condition in the years to come (Parsi 2021).

This quick review of Iran's nuclear behaviour raises the question of why, from 2005 to 2012, Iran resisted international political pressures and economic sanctions (defiance) but from 2012 onwards became cooperative, reached a deal and even after apparent violation of it by the US tried to salvage it (compliance). The inquiry goes on searching the reasons for the vague Iranian approach of neither compliance nor defiance under Raisi. In this paper, I use prospect theory that focuses on the Iranian decision-makers' perception of the costs and benefits of the nuclear programme to explain Iran's nuclear behaviours. To do that, I make a review of the existing explanations about Iran's nuclear programme in three areas of motivations, objectives and behaviours to demonstrate how prospect theory can be an addition to the present literature and how it sheds more light on Iran's nuclearisation. Relying on analysis of the speeches of Iran's primary foreign policymakers, this paper demonstrates that the evolution of the Iranian political elite's attitude to the costs and benefits of the nuclear programme is behind the fluctuations in Iran's nuclear policy between defiance and compliance.

Nuclear Iran: Standard explanations

The literature on Iran's nuclearisation can be divided into the works concentrating on the motivations that drive Iran to go nuclear, those trying to explain Iran's objectives from nuclearisation and those concerned about Iran's actual nuclear behaviours. Although the works concerned for the purpose of this paper are those related to Iran's nuclear objectives and behaviours, the first category will also be briefly reviewed so that the state of current literature and the place this paper occupies in that will be better established. Within the first category there is a range of views about the motivations that drive Iran towards developing an indigenous nuclear fuel cycle. For some authors, Iran's nuclearisation is first and foremost a matter of power maximisation with the ultimate aim of becoming a dominant power. From this perspective, 'Tehran views nuclear weapons as the means to regional preeminence' (Lindsay & Takeyh 2010). As Cortellessa (2016) put it 'Iran's true intention from going nuclear is to dominate its neighboring region.' Pollack (2013) puts Iran's nuclearisation in the context of two ultimate foreign policy objectives: first preserving the Islamic Republic's control over Iran and second reaching a regional hegemon status. Sherrill (2012: 31) also explains Iran's nuclear motivation in offensive terms of seeking dominance and control: 'the regime's desire to possess nuclear arms stems from offensive goals driven by domestic politics'. In opposition to this group, there are others who explain Iran's nuclear motivations in defensive terms. For them, the threat Iran perceives from the United States and its regional allies is the primary factor that drove it to go nuclear in the first place (Walt 2009). Bahgat (2006), who falls into this category, argues that perception of security threats together with domestic political-security dynamics and a sense of national pride drive Iran's nuclear policy. Bock (2014: 114) also points to buttressing the country against security threats as the major motivation behind Iran's nuclear programme: 'Iran has felt threatened, perhaps even endangered, for some time; Tehran's perceived adherence to its nuclear weapons programme can therefore be explained as a reaction to this perceived threat.'

There is also a sociological approach to understanding Iran's motivation to develop a nuclear programme, according to which Iran decided to go nuclear to assuage concerns about its status in the region and the world. The logic is often based on the fact that since the 1979 revolution Iran has been stigmatised and excluded from the international community by the US. Iran is routinely described as a violator of international agreements (United against Nuclear Iran 2019), a threat to international peace and security and a disrupter of regional order (e.g. Shinkman 2019; Danon 2019). This makes Iranian ruling elites believe that the great powers are not ready to respect Iran and to acknowledge the status Iran deserves. Therefore, the only way for Iran to prove itself and to gain

its desired position is to practice self-reliance and to stand up against the great powers' bullying. There are references in the speeches of Iran's foreign policy makers that support the idea that status-related concerns drive Iran's nuclearisation. For instance, reference can be made to the Supreme Leader of Iran's (2016) insistence on 'the internal capabilities of the Iranian nation alone' as the way to achieve development. As Prosser (2017: 18) argues 'Iran's nuclear ambitions have been spurred on by its considerable status expectations on the one hand and disappointment over deficiencies in its regional and global standing on the other—apparently reinforced by the belief that foreign powers have sought to limit Iran's status'. In the same manner, Fitzpatrick (2006: 531) summarises Iran's motivations for nuclearisation as achieving prestige, asserting national pride and sovereignty as well as ensuring that Iran is accorded equality and respect.

There are works that focus on Iran's nuclear objectives are also varied. Some scholars argued that Iran's final goal is to develop an advanced nuclear arsenal. Sebenius and Singh (2012) consider a large nuclear arsenal as the best outcome for Iran's nuclear bids. Reardon (2012) also analyses Iran's nuclear programme based on the assumption that Iran's aim is to build a nuclear arsenal. In opposition to this view, others, including Pillar (2013: 174) argue that the objective of Iran's nuclear programme is not to make a nuclear arsenal: 'Tehran evidently has had an interest in nuclear weapons, reportedly even doing some work in the past on the design of such weapons. Such interest, however, does not equate with the utility function that Sebenius and Singh ascribe to the Iranians.' Others have found ways out of this dichotomy by describing Iran's nuclear objectives in terms of strategic hedging saying that Iran's aim is not to build a bomb but is to secure the technology and the know-how to do it. Bowen, Moran and Esfandiary (2016: 7) write that 'from 2002 to 2013 at least, Iran's approach to the nuclear issue was driven by a strategic desire to hedge its bets. Simply put, this approach involved developing the technical foundations from which nuclear weapons could be acquired relatively quickly if a political decision was taken to do so'. Einhorn (2014: 15) also explains Iran's nuclear objectives in a similar way saying that '...under international pressures Iran suspended its uranium enrichment activities after 2003 but did not abandon its goal of approaching a nuclear weapon threshold.'

There are other works about Iran's nuclear programme that concentrate on Iran's nuclear behaviours. Drawing on the theoretical debates about nuclearisation, Rezaee (2017: 4) distinguishes between optimistic and pessimistic readings of Iran's nuclear behaviour. Optimists regard Iran as a rational actor whose nuclear programme can be curbed through a coercive policy. In contrast to them, pessimists look at Iran as an irrational actor that is 'ready to trigger a nuclear Armageddon at a drop of a hat'. Others have gone beyond this rationality-irra-

tionality duality to explain Iran's nuclear behaviour and also Tehran's reaction to sanctions. Soltaninejad (2015) attributes the failures and successes in negotiations between Iran and the US to lack/presence of mutually hurting stalemates and mutually enticing opportunities. Sebenius and Singh (2012) also point to the absence of any zone of possible agreement to explain failures in negotiation with Iran to settle the nuclear dispute. Parsi (2012) focuses on domestic political limitations as well as fractures among Iran's political elites to explain the nuclear stalemate. Landsberg and Solomon (2010) regard the religiosity of Iran as a major cause for failure in reaching a deal with the West. For them, Iranian diplomacy is faith-based and is focused on the religious methods that remain largely alien to the international community. Dehghani et al. (2010) demonstrate how turning the nuclear energy to a sacred value for a relatively small but politically significant portion of the Iranian population makes compromise on the nuclear programme difficult.

A cognitive addition to the standard explanations

As the above review demonstrates, Iran's nuclear programme is approached from varying angles and there is a rich literature addressing Iran's nuclear motivations, objectives and behaviours. Here, I want to present a novel perspective that has not been considered before; one that adds to our understanding of Iran's nuclear objectives and behaviours evading certain flaws that some of the most cited views suffer from. On the objectives side, my criticism is primarily headed towards first, the *nuclear weapons arsenal* view and second, the *strategic hedging theory* (*nuclear bomb threshold*). On the behaviours side, I critique the two poles of rationality and Irrationality. Methodologically speaking, the recurrent flaw in these works is that they do not infer/describe Iran's nuclear objectives and behaviours in an adaptable way. In fact, these works do not observe shifts in Iran's objectives and behaviours in accordance with Tehran's perception of the conditions under which it develops its nuclear programme. These works propose hypotheses about Iran's objectives and behaviours and try to find evidence that support those hypotheses. In contrast to them, prospect theory as an alternative cognitive approach which I am going to apply, recognises the floating nature of Iran's objectives and behaviours and their adaptability in reaction to the constraints and opportunities Iran faces. In this cognitive approach, the mindset and attitude of the Iranian decision makers is studied at the time they adopt policies and implement them. The way this work studies Iran's nuclearisation is unique in the sense that instead of looking for evidence in Iran's behaviour that confirm fixed and pre-defined objectives, it reads the mindset of the Iranian decision makers through the words they utter to understand what they could possibly define as objectives and adopt as policies.

To better understand the said flaws one should consider that the views expressed about Iran's objectives to go nuclear are not in constant harmony with what Iran has practically done or has been able to do. As I showed earlier, the two major objectives ascribed to Iran's nuclear programme are acquiring a nuclear weapons arsenal (nuclear deterrence) and reaching a nuclear bomb threshold (forward deterrence). These two views have two features in common. First, they only provide hypotheses about Iran's objectives and second, they discredit Iranian officially expressed claims that Iran's nuclear programme is meant to solely serve civilian purposes. In fact, for them what Iran declares as its objectives and what we should believe as Iran's objectives are mutually-exclusive. That explains why serious academic studies of Iran's nuclear programme hardly presume that Iran's nuclear objectives are primarily civilian, as Iran claims. The basic and easily understandable reason not to trust Iran's declared objectives is that the costs Iran has already paid for such a programme are too high that nothing short of deterrence/threshold of deterrence can explain that. A cognitive reading, by contrast, allows for considering conflicting objectives for Iran's nuclear programme all together from pursuing a nuclear weapons arsenal at one extreme and civilian use of the nuclear technology at the other. Reaching a nuclear bomb threshold falls in between. As I will show, prospect theory pictures the trajectory of Iran's move to go nuclear that covers both a possible nuclear deterrence and an extremely hard to deviate civilian nuclear programme. In the former case, no matter what Iran declares as its nuclear objectives, the Iranian perception that it can pursue its nuclear programme with bearable costs directs it to develop its nuclear capabilities to the end, which is the capability to build a nuclear weapons arsenal. In the latter case, Iran is obliged to suffice to civilian use of the nuclear technology and therefore what it declares as its objectives aligns with what it practically does. In fact, in such conditions there is no real chance of diverting from a non-military nuclear programme and therefore we can trust the Iranian officially declared objective of having a civilian nuclear technology.

According to prospect theory, Iran chooses between these options according to its perception of their costs in relation to the gains they provide based on a reference point that I will explain in detail later on. Prospect theory explains such dramatically different objectives by showing that the Iranian nuclear programme is not fixated on either of such objectives and Iran may shift between them in response to the restrictions/opportunities it faces and its perception of being in the domain of gains or the domain of losses. Iran may aim at building a nuclear weapons arsenal or it may stop below the threshold of having a nuclear bomb if the conditions allow for that (when Iran considers advancement of the nuclear programme the dimension according to which it defines its reference point and continuously sees itself in the win domain) and it would stop at the

level of having a civilian nuclear programme that is under robust international inspections if the punishments for developing a nuclear weapon programme is too high (when Iran defines the reference point based on economic considerations and therefore sees itself in the loss domain). It is necessary to add that the Iranian nuclear objectives are hard to measure and no analysis can tell the real aims of Iran with certainty. The objectives, instead, can be inferred from the possibilities and practicalities. Then, instead of providing prophecies about Iran's objectives I present what Iran can consider as its objectives in varying phases and rule out what it cannot. This approach is a substitute to the previously discussed ones that see deterrence and threshold of deterrence as Iran's ultimate targets.

Similar to the views about Iran's nuclear objectives, the opinions expressed about Iran's nuclear behaviours suffer from certain flaws. According to Rezaee's classification that I reviewed before, theories that explain Iran's nuclear policies are mainly formulated around the concept of rationality; either regarding Iran as a rational actor whose nuclear policies can be changed by increasing the costs it would pay to go nuclear or an irrational actor that cannot be directed towards compliance through coercive measures. The works that focus on the religiosity of Iran (faith-based diplomacy) and transformation of the nuclear programme to a sacred value are close to this latter class. The views that regard Iran as a rational actor cannot tell us why Iran invested substantially in a programme that would buy it loads of sanctions, cost its coffers billions of dollars and bring it international isolation only to be obliged to reverse it according to a deal. A rational actor is expected to have a sound calculation of the costs and benefits of the policies it adopts and therefore chooses policies with the highest probability of win and evades those with costs that surpass the gains. This logic cannot explain Iran's behaviour that has oscillated between reckless advancement of the nuclear programme and the readiness to drastically restrict it. In some periods of the nuclear discord, coercive policies simply failed to oblige Iran to abandon its nuclear programme and even their combination with incentives was insufficient to persuade Iran to change its defiant course. In other periods, Iran was ready to ship all its enriched uranium overseas, deactivate the most significant of its nuclear facilities and accept the most robust of international inspections just to get sustainable relief from sanction. These dramatic shifts in Iran's behaviour are better explainable when going beyond the rationality-irrationality dichotomy and instead regarding Iran as a rational actor that doesn't have a fixed calculation of the costs and benefits of its nuclear programme but rather calibrates its policies according to the deviations from a reference point. The other way around, the same discontent is observable in the views that regard Iran as an irrational actor. Although pressures and coercion failed to change Iran's behav-

iour into submission for some years, Iran's ultimate consent to accept proposals for reconciliation was out of the expenses imposed on Iran's economy and the political isolation Iran tolerated as a result of its nuclear programme. Therefore, Iran cannot be seen as an irrational actor with religiously or ideologically formulated nuclearisation plans that are impervious to foreign pressures.

Prospect theory: From rejection to acceptance of a nuclear agreement
Having a review of the flaws in the existing literature, I now turn to prospect theory as an addition that sheds light on the shifting nature of Iran's nuclear objectives and behaviours. The first step is to locate prospect theory in the greater realm of cognitive theories. In general, cognitive theories are developed in reaction to the rational choice theory. According to the rational choice theory people have stable and regular preferences and before making a decision they gather as much information as possible and evaluate the probable outcomes of their decisions carefully. The cognitive approach recognises rationality in foreign policy decision-making but it takes into account its limitations with a special focus on the factors that hinder foreign policy decision-making based on accurate cost and benefit calculations (Mintz 2007). Cognitive theories have contributed to our understanding that foreign policy decision-makers are affected by certain factors that prevent them from functioning as calculating machines. Some of the most recurrent cognitive concepts and analytical instruments used in foreign policy studies are: heuristics (Tversky & Kahneman 1974), prospect theory (Levy 1992), motivational reasoning (De Dreu & Carnevale 2003), clichés (Booth 1995), misperceptions (Jervis 1976), metaphors (Shimko 1994), analogical reasoning (Hehir 2006) and social preferences (Kertzer & Rathbun 2015). All these concepts, one way or another, refer to the fact that policymakers' minds have a limited capacity to analyse realities. Therefore, they use mechanisms to simplify the world. Here, cognitive and rational choice approaches part ways. In the remainder, I focus on prospect theory to see how the evolutionary and adaptive understanding of Iran from the gains of the nuclear programme versus its costs shape Iran's nuclear objectives and behaviours.

Prospect theory was first proposed by Kahneman and Tversky (1979). Their theory was based on a series of experiments and highlighted inconsistencies between behaviour and expected utility theory. Expected utility is the theory of choice to explain decisions that states take under conditions of risk. Expected utility asserts that in their choices between risky options, individuals try to maximise their marginal utility. To do so, they weigh the utility of individual outcomes by their probabilities and choose the option with the highest weighed sum (Luce & Raiffa 1957). It means that to choose between options and strategies, actors evaluate their marginal utility. Kahneman and Tversky demonstrat-

ed that expected utility is descriptively inaccurate. In practice, people deviate from the expected utility in a systematic way and make their decisions not on their expectation of the final outcome but rather on deviation from a reference point (Vis & Kuijpers 2018).

The primary finding of Kahneman and Tversky's experiment is that values are attached to changes rather than final outcomes. In their experiment 80% of respondents preferred a certain outcome of $3000 to an 80% chance of $4000 and a 20% chance of nothing. If faced with the same two negative prospects, however, 92% of respondents preferred to gamble on an 80% chance of losing $4000 and 20% of losing nothing to a certain loss of $3000. Having these results, Kahneman and Tversky proposed that people are not really sensitive to final outcomes but they are instead primarily concerned about departure from an initial position or the reference point. In fact, people frame their decisions around a reference point (Levy 1992: 171). Thus, people think in terms of gains and losses and their preferences change as they shift positions between the domains of gains and losses. Gains are treated differently than losses in that losses loom larger than gains: I hate to lose more than I like to win (Levy 1992: 174-175). As McDermott (1998: 18) put it, prospect theory predicts that individuals are risk-averse in a domain of gains, or when things are going well, and relatively risk-seeking in a domain of losses, as when a leader is in the midst of a crisis. According to prospect theory, individuals tend to remain at the status quo. Status quo is the main reference point for the states in framing a decision-making problem and the loss aversion properties of the value function imply that the disadvantages of leaving the status quo are overweighed relative to the corresponding advantages. This is also the case in international relations where states are primarily concerned about preserving the status quo and not improving their position.

To see how prospect theory can provide an insight into Iran's nuclear programme I am reliant on an interpretive method of qualitative discourse analysis. The most available data that would enable me to get into the minds of Iranian policymakers are the speeches they deliver about the nuclear programme. I try to find out how Iran's understanding of the costs and benefits of its nuclear programme has evolved by analysing the speeches delivered primarily by Iran's Supreme Leader and also Iran's presidents and other officials. As Daddow (2015) argues 'the beliefs of foreign policy actors can be accessed . . . via the interpretation of published data by and about those actors'. He further argues that 'when a politician repeats a central idea in various places to different audiences, then he or she is setting out to persuade those interlocutors of the rectitude of the politician's position. It further assumes that politicians do not use language – all the time – as a smokescreen to hide or obscure their "real" intentions' (Daddow 2015).

Based on the above, to understand Iran's nuclear behaviour the reference point as well as the domains of loss and gain should be portrayed. Before trying to determine the reference point, it should be noted that this is the most challenging task when applying prospect theory. As Taliaferro (2010) shows, prospect theory literature suffers from conceptual and methodological difficulties, mainly around the issues of reference point selection, framing and preference reversal outside laboratory settings. Mercer (2005: 4) also recognises this difficulty saying that even when status quo is regarded as the reference point, establishing the point is challenging. Following Stein (2017), Vis and Kuijpers (2018: 580) argue that what makes determination of the reference point especially challenging is the fact that actors face outcomes in multiple dimensions. They bring up the case of a state facing the dilemma of making a foreign policy decision that strengthens its international standing (gain in dimension 1) but weakens its domestic standing (loss in dimension 2) as an example. Scholars have taken varying paths to tackle this challenge. The first way is a deductive one in which researchers may decide what dimension states consider to establish the reference point using an already existing theory. Taliaferro (2004), for instance, has used defensive realism to conclude that states regard the international dimension (against the domestic dimension) as their criteria to choose the reference point when deciding to have a risky military intervention overseas. The second way is an inductive one in which the researcher finds the reference point of a given state through a close observation and empirical study of its preferences. A decent example is Linde & Vis' (2017) experiment of the Dutch parliament's consideration of the two dimensions of economic and electoral to see how they frame the reference point.

Having these methods in mind, I sketch Iranian decision makers' framing of the reference point between the two dimensions of first, *advancement of the nuclear programme* and second, *economy* through observation of the Iranian Supreme Leader's choice of words and the way he frames these two dimensions. The idea is that when the Supreme Leader repeatedly and constantly underlines the benefits of the nuclear technology, he is seeing the advancement of the nuclear programme as the reference point. In such times, Iran's primary concern is preserving the nuclear achievements, and economic considerations take a back seat compared with that. The more Iran progresses towards completing the nuclear fuel cycle, increases its centrifuges, improves their quality and adds to its stockpile of enriched uranium the more it feels that it is in the win domain. And when in the win domain, Iran refrains from entering arrangements with the US as an untrusted interlocutor. Under such conditions, Iran believes that it should not let go of its precious nuclear achievements in the hope that the US would keep its promises in accordance with a deal. The other way around, when the

Supreme Leader's tone of speaking and choice of words changes from underlining the benefits of the nuclear technology and praising the progress Iran makes in developing the nuclear programme to underscoring the economic costs imposed on Iran as a result of US punitive measures, it is an indication that the reference point is in a state of transition/already transited to economy away from advancement of the nuclear programme. With the rise in economic costs, Iran starts to see itself in the domain of losses where economic sacrifice is too high to be ignored or downplayed. Under such conditions, the decline in revenues, loss of the oil market and exclusion from the global financial system become the yardsticks according to which Iran evaluates its conditions. Then, Iran's response shifts towards accepting the risk of entering a deal with the US and compromising its nuclear achievements in the hope that the economic pains would be substantially and sustainably relieved.

To understand the attitudinal evolution of Iran's policy makers about the costs and benefits of the nuclear programme, I made a longitudinal study of the speeches of Iran's Supreme Leader delivered in the course of sixteen years, from 2005 to 2021. The speeches of Iran's Supreme Leader were accessed from the website 'preserving and disseminating the works of Ayatollah Khamenei' in which they are archived in order of the time they were delivered and according to their main themes. The website's archive was searched for keywords 'nuclear' and 'sanction'. The relative frequency of these words was registered in three periods of 2005-2012, 2012-2016 and 2016-2021. The first period encompasses the years from the start of the nuclear dispute between Iran and the US after the Iran-European troika arrangements failed until the start of direct talks between Iran and the US over the nuclear issue. The second period covers the years of Iran-US negotiations until the nuclear deal was signed. The third period starts from the signing of the JCPOA and lasts to date. In these three periods, it is observed how the two words of sanctions and nuclear are mentioned. In the remainder, these periods are studied in turn.

The first period: Defiance
During the first period under study, the reference point was mostly formulated around Iran's perceived precious advancement of its nuclear programme that was clearly reflected in mastering nuclear science and technology as well as the increasing number of centrifuges and the growing ability to enrich uranium. This means that contrary to the principle of expected utility, Iran was not concerned about the utility of the final outcome that could be calculated by subtracting the costs of going nuclear from its benefits. In this period, Iran's nuclear behaviour was defying the calls for suspending its uranium enrichment programme, preserving the nuclear advancements and continuing to complete

a domestic nuclear fuel cycle. This behaviour was not driven by a cost-benefit calculation of the ultimate outcome of its nuclear quest under the shadow of sanctions but was rather energised by the desire to preserve the status quo and adding to it. The result on the ground was that in the words of Abbas Araghchi, the ex-deputy foreign minister of Iran, 'during Ahmadinejad's presidency *Nezam's* (the political system) policy was that we advance our nuclear objectives without paying attention to the probable sanctions' (YJC 2015). Likening the acceptance of uranium enrichment suspension in return for the EU incentives to 'exchanging pearl for candy' by Iran's ex-chief nuclear negotiator, Ali Larijani (Alef 2007) also demonstrates that Iran's primary concern was preserving the status quo (nuclear achievements and the prospects of adding to them) instead of having a nuclear technology that is worth the cost.

A review of the statements of the Supreme Leader of Iran during the period Iran showed maximum defiance to the United States' threats (from start of the nuclear dispute in 2005 until start of direct talks between Iran and the US in 2012), demonstrates that the pivotal concern of Iran was continuing to complete the nuclear fuel cycle and developing a domestic nuclear technology. Searching the keyword 'nuclear' in the speeches of Iran's Supreme Leader during this period comes up with 103 mentions out of which 75 cases (72.8 per cent) were centred on the benefits of the nuclear technology. In these speeches nuclear technology is seen as beneficial on the following grounds: it is the factor of Iran's power, it is a requisite for Iran's economic development, it serves scientific and technological advancement, it is an indigenous industry, it is a substitute for oil, it is a means for national unity and cohesion, it is necessary to produce electricity, it's a diplomatic and political achievement, it's a record for the *Nezam* (political system) and a sign of its efficiency, it is a means to boost national pride, it's a historical achievement based on which the Islamic republic will be judged in history. In this period, there was only one reference (0.97 per cent) to the costs of the nuclear programme and there were only four cases of referral to the costs and benefits both together (3.8 per cent). The remaining 23 cases (22.3 per cent) were neutral with no inclination to the benefits or the costs of the nuclear programme. (See Figure 1)

The above analysis suggests that during this period Iran was not acting according to the expected/marginal utility. If marginal utility guided Iran's nuclear programme, there should have been a considerable number of references to the prospects of the costs that Iran would pay to develop the nuclear programme. It further suggests that Iran's behaviour was driven by the desire to preserve the status quo and the positive trend of advancing its nuclear programme. Some examples of how 'nuclear' was framed in the speeches of Ayatollah Khamenei are: 'Westerners' propaganda about the nuclear energy is aimed at depriving the

Figure 1. Percentage distribution of referral to "nuclear" in the statements of Iran's Supreme Leader (2005-2012)
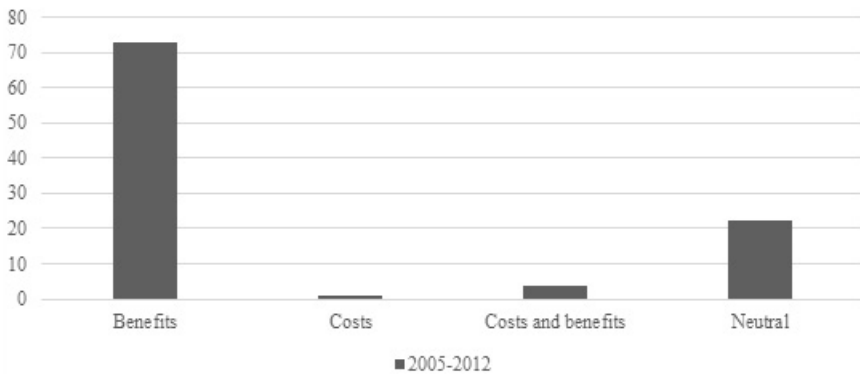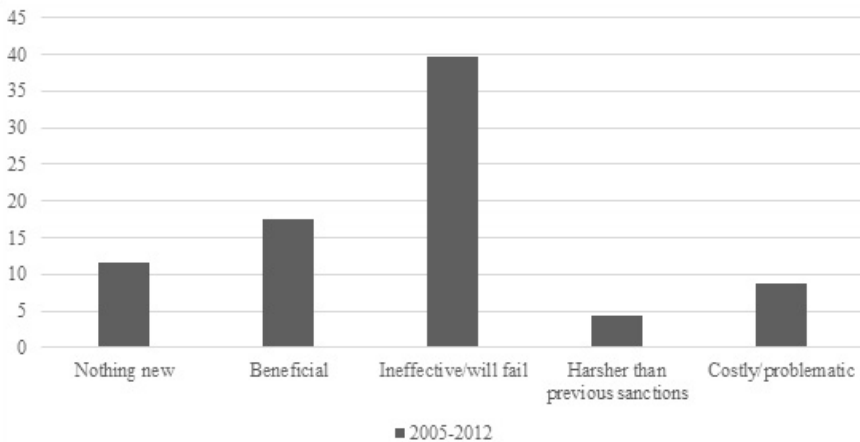

Source: the author

Iranian nation from a scientific and technological progress. This [progress] is our right. Why should we be deprived of that? . . . Nuclear energy is the inalienable right of the Iranian nation; this is science, this is technology, this is protection of the environment, it has medical purposes, it is our youth's hope for development. There is no doubt that our nation will not abandon it' (Khamenei 2005a); 'We are thinking about a scientifically and economically justified work [nuclear energy] that is in line with our national interests, our nation wants it so we resist [to gain it]' (Khamenei 2005b).

To better understand Iran's perception of the costs and benefits of the nuclear programme a similar search is done on the keyword 'sanctions' in the speeches of Iran's Supreme Leader delivered in the same time span. The search came up with 68 cases of reference, the majority of which (27 cases or 39.7 per cent) were centred on the notion that sanctions are ineffective, they are doomed to failure or development is possible despite sanctions. In 12 cases (17.6 per cent) the Supreme Leader saw sanctions as even beneficial and in eight cases (11.7 per cent) as nothing new, meaning that the nuclear sanctions are no different from the sanctions Iran had already experienced from the beginning of the revolution in 1979. During this period, in only six cases (8.8 per cent) there was a reference to the harmfulness/effectiveness of sanctions. Likewise, in only three cases (4.4 per cent) the Supreme Leader admitted that nuclear sanctions are different from previous sanctions (harsher and more harmful). Even these six and three cases of admitting the harmfulness of sanctions that made them distinct in Iran's post revolution history were made in the last two years of the period under study. It means that for the first five years since the start of the nuclear dispute (2005-2009) there was not even a single reference to harmfulness of sanctions. Nuclear sanctions were depicted as normal, in continuation of the US previous sanctions, harmless and even beneficial (See Figure 2). Some examples of how sanctions

were mentioned in the speeches of Ayatollah Khamenei in this phase are: 'They [the US and Europe] threaten that we sanction the nation of Iran but haven't you done that already?! We are developed now and we are in the forefront of scientific and industrial development in the region. This status is achieved under sanctions' (Khamenei 2006a); 'They threaten that they sanction us. Sanctions cannot inflict any damage upon us. Haven't they sanctioned us already? We achieved nuclear technology under sanctions. We gained scientific achievements under sanctions' (Khamenei 2007); 'When they sanctioned us Imam [the late Ayatollah Khomeini] expressed satisfaction and said even better! He was right. We pulled together in reaction to sanctions. It is also the case today. You want to threaten the Iranian nation with these words?! They are useless' (Khamenei 2006b).

Figure 2. Percentage distribution of referral to (nuclear) sanctions in the statements of Iran's Supreme Leader (2005-2012)

Source: the author

As far as Iran's nuclear objectives are concerned, in this period Iran could have pursued both a civilian nuclear programme and a military-oriented one. Although Iran never implied that it is pursuing a military nuclear capability, the mere fact that Iranian priorities were geared towards development of the nuclear technology makes it impossible to rule out the scenario that Iran's ultimate objective was to develop a nuclear weapons arsenal. In addition to that, as review of the statements of Iran's supreme leader demonstrates, Iran perceived the pictured punishments for continuation of the nuclear programme manageable and therefore would see it possible to make a nuclear bomb. Despite this, Tehran was unsure about the strategic ramifications of building nuclear weapons that could provoke the US, Israel and its Arab neighbours in the Persian Gulf to encircle it even further and put permanent pressures on that. Moreover, in this period,

Iran was already satisfied with the balancing and deterring level that its existing means of power had brought it. Iran's defence doctrine was, and continues to be, primarily relied on developing its missile capabilities as well as expanding its strategic depth through sponsoring Shia organisations throughout the region. During the period under study, Tehran was doubtful whether building a nuclear weapons arsenal would give it further privilege than what it already had. A military nuclear power could even weaken Iran's position in the region by ushering in a nuclear arms race. Then, Iran's most conceivable objective could be to master nuclear science and technology necessary to build nuclear weapons but not to build such weapons or make a large arsenal of them.

The second period: Compliance

Talking about 'nuclear' as mainly an asset and denying effectiveness of 'sanctions' continued as long as Iran was seeing itself in the win domain. In this period, Iran was mastering nuclear science and technology, the number of centrifuges and amount of enriched uranium was in the rise and no real pressure on the economy was felt. In 2005, Iran had only 200 centrifuges that rose to 19,000 in 2012 (Davenport 2015). It was only after the sanctions showed their real damaging effects that Iran's behaviour and rhetoric started to change. The change in behaviour was that it turned cooperative, seriously negotiating to resolve the nuclear issue and then preserving the nuclear deal was accompanied by a change in the way Iran talked about sanctions and is a sign of the change in Iran's perception of the reference point and the reality that it is moved to the domain of losses. During this phase, the dimension according to which Iran defined the reference point shifted to economic considerations away from nuclear advancements. The prevailing of economic considerations over the nuclear achievements was a result of the constantly degrading economic conditions as a result of sanctions. In 2011, before the direct talks between Iran and the US started, Iran exported 2.6 million b/d of oil. In 2012, as the US and the EU imposed sanctions the buyers of Iran's oil either halted or reduced their purchase in a way that a year later, in 2013, Iran's crude oil and condensate exports dropped below 1.3 billion dollars p/d (Energy Information Administration 2015).

The change in the way Iran defined its reference point and the subsequent perception that Iran is moved to the loss domain as a result of economic sanctions can be understood again through analysis of the speeches of the Supreme Leader on the nuclear programme and the sanctions delivered from the time direct nuclear talks between Iran and the US started in 2012 until the signing of the nuclear deal in 2015. In this period, the word nuclear is mentioned 50 times out of which the majority of cases (20 cases) are focused on the costs of the nuclear programme which amount to 40 per cent of all mentions. This is

in stark contrast to the less than one per cent mentions of the word nuclear in a context denoting its costliness in the first period of the study. In six cases, costs and benefits of the nuclear programme are brought together and this time only 16 mentions are dedicated to the usefulness of the nuclear programme (32 per cent) down from 72.8 per cent of the time Iran was seeing itself in the domain of gains (See Figure 3). In this period, the Supreme Leader refers to the damages inflicted upon Iran as a result of sanctions more frequently. He describes the costs of the nuclear programme as a cruelty that is imposed on the Iranian nation: 'Today a huge nuclear cruelty is imposed on us. They [the US/great powers] don't massacre us like what they did in Myanmar only because they cannot do that. They wouldn't shy away from committing even that if it were in their power' (Khamenei 2012a).

Figure 3. Percentage distribution of referral to "nuclear" in the statements of Iran's Supreme Leader (2012-2016)
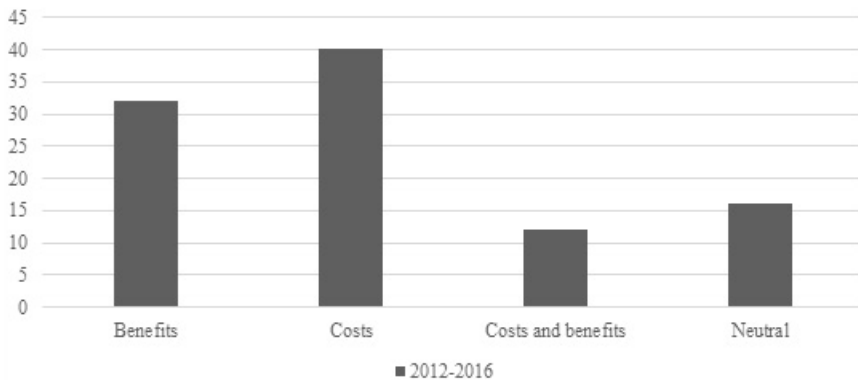
Source: the author

During this period the way the Supreme Leader mentioned sanctions was also dramatically changed, from rejecting the idea that sanctions can be effective and harmful to admitting it. In this period sanctions was repeated 72 times in the speeches of the Supreme Leader, out of which 45 cases were directly suggesting that the sanctions are hurtful. This amounts to 62.5 per cent of all mentions that is a considerable increase in comparison with the first period of the study that the effectiveness of sanctions was admitted only in 8.8 per cent of all mentions. In this period sanctions were referred to as ineffective and beneficial only in four cases each, which is 5.5 percent, down from 39.7 per cent and 17.6 per cent respectively in the first period. During that time Iran embarked on direct talks with the US till the time the JCPOA was signed, it is also more commonly admitted that the nuclear sanctions are different from the sanctions imposed on Iran from the beginning of the revolution (an increase to 9.7 per cent from 4.4 per cent) (See Figure 4). In this

period, sanctions are commonly referred to as savage, cruel and illogical. Some examples are: 'They pretend that they lift sanctions if Iran abandons its nuclear energy. They lie! They impose illogical sanctions out of their grudge. These Sanctions are literally savage in the eyes of all wise and just peoples of the world. This is a war against a nation' (Khamenei 2012b). 'I do not refuse to accept that the cruel sanctions that the enemies of the revolution imposed on Iran's nation are effective. Yes they undoubtedly have their effects' (Khamenei 2015).

Figure 4. Percentage distribution of referral to (nuclear) sanctions in the statements of Iran's Supreme Leader (2012-2016)
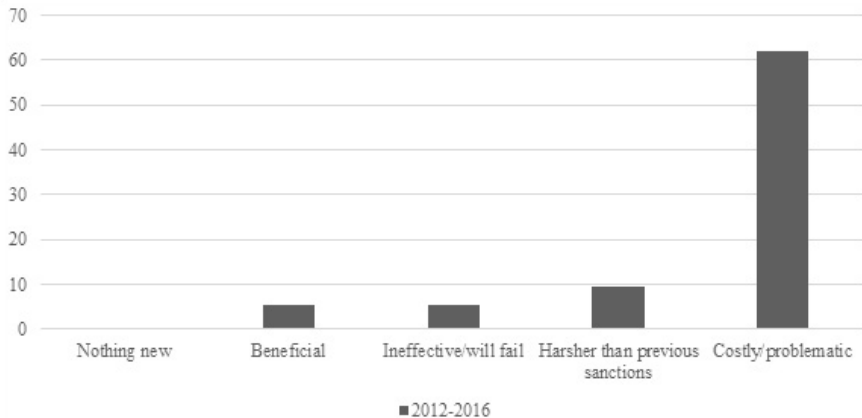

Source: the author

Economic hardships imposed by sanctions and the prospect of their aggravation that turned Iran cooperative and obliged it to compromise its nuclear rights in return for sanctions relief has obvious implications for inference of Iran's nuclear objectives. Minimising the uranium enrichment level to 3.67 percent, confining the number and type of centrifuges to 5060 IR-1, deactivating some nuclear facilities and readjustment of others to solely civilian use along with accepting the most robust of international inspections demonstrate that in this phase Iran's nuclear objectives were only civilian, as an unnoticed deviation form the agreement could be extremely difficult. In other words, the process of negotiating a deal that would drastically restrict Iran's nuclear activities is a strong reason to believe that Iran's nuclear objectives were civilian.

The third period: Unsure to defy or to comply
The third period concerning the cost-benefit calculus of the nuclear programme and its effect on the actual nuclear policy of Iran starts from 2016, which is a year after the nuclear deal was signed and lasts to date. In this period a shift in favour of the gains of the nuclear programme in comparison with the costs is observed.

From a total 34 mentions of the word nuclear, 16 (47 per cent) are about nuclear advancements or/and their benefits that is an increase from 32 per cent of the second period. This, however, is still much less than the 72.8 per cent of the first period in which nuclear was primarily seen as an achievement. In a similar manner, talks about the costs of the nuclear programme drops to eight cases (23.5 per cent) down from 40 per cent of the second period. Again this is still much higher than the rate in the first period when less than one per cent of the mentions of the word nuclear were pointing towards its costs. (See Figure 5).

Figure 5. Percentage distribution of referral to "nuclear" in the statements of Iran's Supreme Leader (2016-2021)
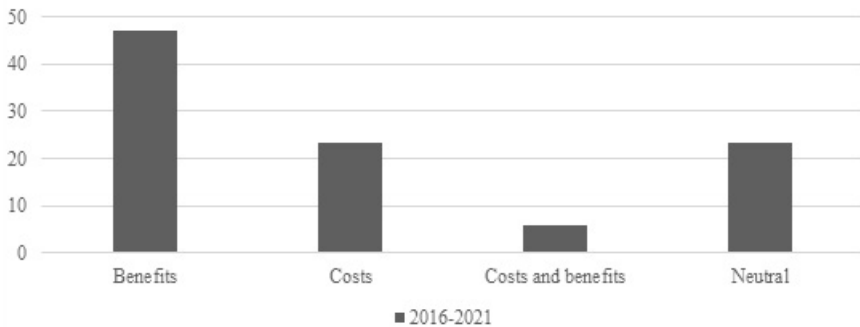

Source: the author

A similar trend is also observable with respect to the Supreme Leader's attitude towards sanctions where the expressions about harmfulness of sanctions decreases to 42.1 per cent down from 62.5 per cent of the second period. The usefulness of the sanction, on the other hand, is raised to 9.6 per cent of all mentions compared to 5.5 per cent of the second period. Ineffectiveness of the sanctions is also slightly raised to 7.2 per cent compared with the 5.5 per cent of the second phase. There is still a huge gap between these numbers and those of the first phase when sanctions were seen as ineffective in 39.7 per cent and beneficial in 17.6 per cent of the whole mentions. In that phase, sanctions were seen as effective in only 8.8 per cent of the whole pool of references (See Figure 6). Some examples of how sanctions are mentioned in the third phase are: 'There is no doubt that sanctions are a crime committed by the United Stets. It's a blow to the Iranian nation by the US' (Khamenei 2020). 'The economic blockade applied against us and some other nations by the US is one of the most severe crimes a state can commit. . . . A crime that a state able to massacre 220 thousand people in a single day can do' (Khamenei 2021).

As the above diagrams show, in the third period the costs of the nuclear programme are well recognised and sanctions are still mostly referred to as problematic. Then the reference point for Iran is still defined based on the economy

Figure 6. Percentage distribution of referral to (nuclear) sanctions in the statements of Iran's Supreme Leader (2016-2021)
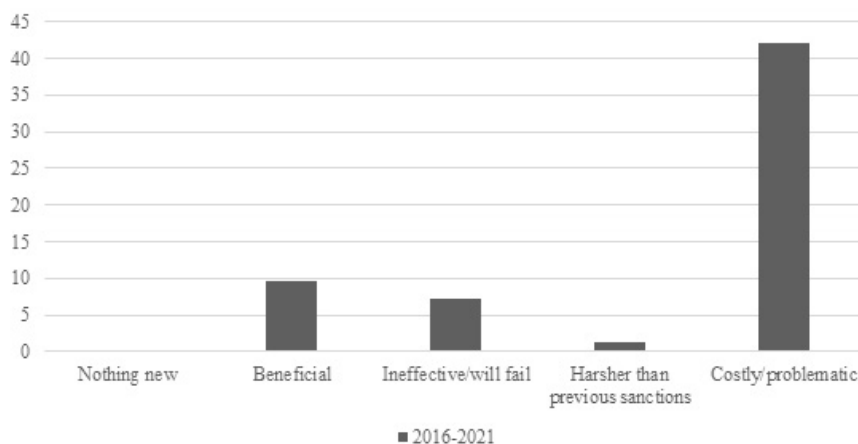
Source: the author

dimension and Iran continuously sees itself in the domain of losses. It should be argued here that a major difference between the second period and the third period led to the third period's dissimilar reaction of Iran to the fact that it is still in the domain of losses. The different reaction of Iran was a reflection of the fact that the United States did not respect its commitments during the remainder of Obama's presidency and then abandoned the deal under Trump. These led to a change in the cost-benefit calculation of Iran between the values of the nuclear deal versus its costs. As a result of the US breach of its commitments Iran assumes that a future deal with the US will not remove sanctions in a sustainable way. Therefore Iran should stick to the nuclear achievements instead of pinning hopes on sanctions relief. This is reflected in the statements of Ayatollah Khamenei when he says: 'They [European countries] expect that the nation of Iran tolerates sanctions and abandons the nuclear activities both together. I am telling them that this nightmare won't come true' (Khamenei 2018a). Reconsideration of the way to address sanctions is also demonstrable in another statement of Iran's Supreme Leader when he expresses regret about the way Iranian officials talked about sanctions as harmful: 'The enemy has felt that our country is prone to sanctions. Unfortunately we ourselves strengthened such perception. In some periods and on some occasions, we inflated [the significance of] sanctions saying that we must remove them. We exaggerated the significance of sanctions removal . . .' (Khamenei 2016).

In the second period Iran was confronted with a dilemma of whether the US would adhere to the commitments it would make under a deal or not. Under pressures of sanctions and international isolation Iran took the risk and compromised its nuclear rights to receive sanctions relief. However, in the third pe-

riod, the US breach of its commitments is not a risk for Iranians but is rather a foregone eventuality. This is reflected in the speeches of Ayatollah Khamenei when saying: 'My understanding is that the sanctions are there, they should be there and they will not be lifted' (Khamenei 2019). In fact, the experience of the JCPOA tells Iran that sanctions are an integral component of the US strategy of containment. Iran has come to the conclusion that the US will not be satisfied by anything short of Iran's ultimate surrender. Iran's capitulation, however, cannot be achieved all at once. Therefore, the US seeks to make Iran surrender phase by phase. The first phase is to force Iran to limit its nuclear programme but without a sustainable sanctions relief. Sanctions should be kept as the primary leverage to extract further concessions from Tehran. After Iran's nuclear programme is neutralised it would be the turn for Iran's missile programme and then its regional involvements. The confidence that the US will not remove sanctions in a sustainable way is reflected in the speeches of Ayatollah Khamenei, who, on several occasions, has talked about the lessons that Iran should learn from the JCPOA. Some examples are: 'We have learnt [from JCPOA] that the Islamic Republic cannot interact with the US. Why is that? It is because the US will not adhere to its commitments. Don't tell me that these are Trump's doings. No. The previous US administration also reneged on its commitments' (Khamenei 2018b). 'They tell us that if you want sanctions removed, you should include a sentence in the agreement that you would talk to us about other issues in future. This sentence would be a pretext for their future interferences in various issues including the missile program and the region' (Khamenei 2021).

In spite of the belief that the US will not keep its pledges to Iran according to any agreement, the balance is not radically shifted in favour of another full defiance. This is because the pressures of sanctions are still there, the risk of their ramifications looms large and some venues of oil sell is allowed to be open for Iran under Biden with the prospect of JCPOA revival (Jakes 2021). After two years of rise (2016-2017), under Trump's maximum pressure policy Iran's oil exports started to decline dramatically and the inflation rate increased substantially. After a considerable rise in Iran's oil exports to over 2 million b/d in 2017, in 2018 it decreased to 1.549.991 b/d and then plummeted to less than half a million b/d in 2019. This even decreased more in 2020 when Iran managed to export only 440.323 b/d of oil (Fred Economic Data 2021). The pressures of sanctions are also reflected in other economic indicators including the inflation rate that was 9.1 per cent in 2016 but mounted to 39.3 per cent in 2021 (IMF 2021). There have even been estimates that in case sanctions remain in place, the equivalency of Iranian currency (Rial) to the US dollar will reach a record of 280.000 to 1 in 2027 (Bourseno 2021), which would be ten times more than the rate in 2021. This impact of sanctions on the Iranian economy

and the prospects of its aggravation is reflected in the statements of Ayatollah Khamenei by addressing sanctions as *mean* and *criminal* instead of ineffective/beneficial (in the first period) or cruel/illogical (in the second period). This awkward position of suffering economically accompanied by the belief that the US will not keep its pledges explains Iran's 'vague and noncommittal' approach towards the nuclear talks under Raisi (International Crisis Group 2021) with his government's rhetorical support of JCPOA revival (to keep the economic conditions manageable) and practical build-up of the nuclear capabilities in utter violation of that.

Figure 7. Percentage distribution of referral to "nuclear" in the statements of Iran's Supreme Leader (2005-2021)
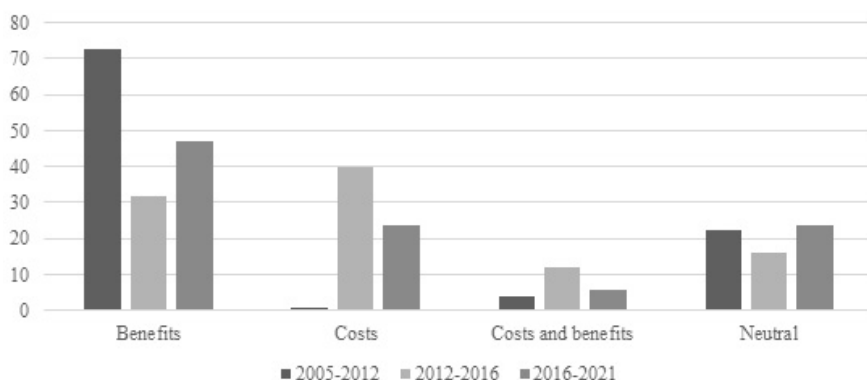
Source: the author

For a comparison of percentage distributions of the two words of nuclear and sanctions in the three periods of the study see the Figures 7 and 8.

When it comes to the nuclear objectives, Iran is now entangled between two conflicting considerations. On the one side, the persistent status of Iran in the domain of losses and the fact that economic hardships form the dimension according to which the reference point is defined justify Iran's pursuit of a mere civilian nuclear programme. Under the current conditions, Iran's primary need is sanctions removal and therefore Iran is ready to compromise its nuclear rights again to regain its economic stability. On the other side, the experience of the JCPOA tells Iran that the US's ultimate aim is to contain Iran and therefore sanctions will never be lifted in a sustainable way. Tangled between these two, none of the three discussed objectives can be ruled out. Iran may be after a nuclear weapons arsenal, it may suffice to a weapon threshold nuclear technology or it may still think of securing a civilian nuclear level. Despite this, the priority of economic recovery over strategic uses of the nuclear programme brings forth a fourth objective that is to increase its nuclear capabilities only to use them

Figure 8. Percentage distribution of referral to (nuclear) sanctions in the statements of Iran's Supreme Leader (2005-2021)
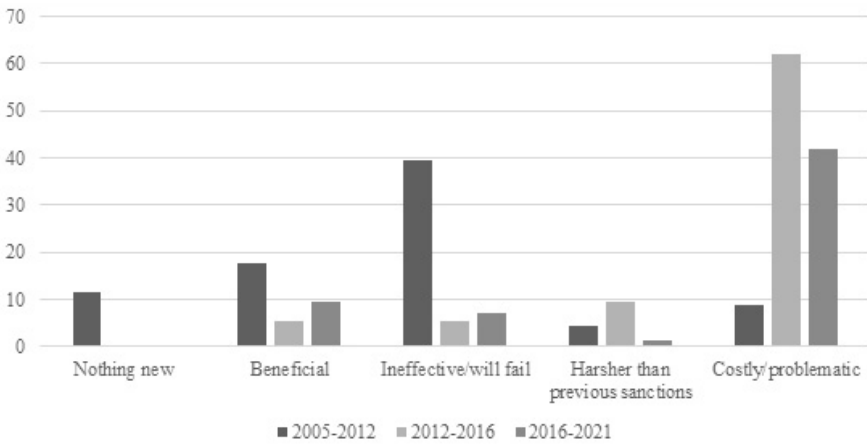

Source: the author

Table 1. Iran's nuclear behaviours and objectives in the three periods

Period	Dimension to define the reference point	Domain	Behavior	Possible objectives	The most conceivable objective
2005-2012	Advancement of the nuclear program	Gains	Defiance	Nuclear weapons arsenal Strategic hedging Civilian use	Strategic hedging
2012-2016	Economic considerations	Losses	Compliance	Civilian use	Civilian use
2016-2021	Economic considerations	Losses	Between defiance and compliance	Nuclear weapons arsenal Strategic hedging Civilian use Leverage building	Leverage building

as leverages to pressure the US into re-entering the nuclear deal and removing the sanctions. In fact, it appears that Iran is taking a couple of steps forward to build a strong negotiating position. Then, it would take some steps backward as necessary compromises for a deal without being obliged to give concessions on other sources of disagreement with the US that are its regional involvements and its missile programme.

Conclusion

This paper demonstrated that a cognitive addition to the existing literature on Iran's nuclear policy can help us better understand Iran's nuclear objectives and behaviours. Prospect theory, as a significant development in cognitive foreign policy analysis, explains the differences in Iran's nuclear objectives and behaviours in the three periods of 2005 to 2012, 2012 to 2016 and 2016 to 2021 in terms of Iran's perception of being in the domain of gains or the domain of losses. Analysing Iran's nuclear objectives according to prospect theory demonstrates that such objectives are not fixed and Iran may shift between a series of them according to its understanding of the benefits of the nuclear programme versus its costs. This cost and benefit calculation is based on Iran's perception of deviation from reference points that are floatingly defined according to the two dimensions of advancement of the nuclear programme versus economic considerations. During the first period and while Iran was seeing itself in the domain of gains, advancement of the nuclear programme was Iran's reference point and therefore its nuclear objectives can be any of these three: deterrence, forward deterrence or civilian use of the nuclear technology. In the second period, Iran defined the reference point according to economic considerations and therefore was seeing itself in the domain of losses. As a result, its nuclear objectives can only be civilian as the two other hypothetical objectives lose their relevance in relation to the reference point. The result was Iran's readiness to let go of its nuclear achievements in return for a sustainable sanctions relief. In the third period, Iran's continued perception that it is in the domain of losses combined with its understanding that the US will not adhere to any deal, make it possible that Iran has all the three objectives in mind without being fixated on any of them. The reference point in this period is still economy but contrary to the second period, Iran does not expect that compromising the nuclear advancements would lead to a sustainable sanctions relief. This puts Iran's objectives in another state of flux. The most conceivable objective, though, is to build leverages by developing its nuclear programme beyond JCPOA limitations to push the US towards re-entrance to the deal without asking for further concessions from Iran on the other sources of difference, particularly Iran's regional involvements and its missile programme.

When it comes to Iran's nuclear behaviours, the cognitive study goes beyond the rationality-irrationality dichotomy as it recognises the fact that Iran is a rational actor but in a bounded way. Iran's nuclear policy is based on a calculation of the costs and benefits of the nuclear programme that evolves over time within a learning process. The cognitive approach also proved useful to see Iran's nuclear policy from an adaptive and evolutionary prism so that the behaviours of Tehran are analysed according to the dominant attitudes and understandings of the Iranian decision makers at the time of their happening. During the first period, Iran saw itself in the gain domain and was therefore reluctant to compromise its nuclear achievements. Iran did not accept proposals for settlement because the gains from such proposals were perceived as far less valuable than what Iran would give in return. In this period, Iran was risk-averse, not giving up its nuclear achievements in the hope of US adherence to its commitments. Tehran became ready to compromise and accept the risk of a deal with the untrusted US only when it found itself in the loss domain under the heavy pressures of sanctions. Continuation of this perception after the US exit from the JCPOA explains Iran's efforts to salvage the deal. Iran's gradual shift towards reciprocating the US breach of its commitments in the form of scaling back some of its commitments, restricting access of the IAEA inspectors to some nuclear sites and increasing the level of uranium enrichment under Rouhani followed by Raisi's vague position between return to the deal and building up nuclear capabilities can also be explained in terms of the shift in Iran's calculation of the benefits of the nuclear deal versus its costs. While deep in the domain of losses, Iran is measuring the costs of another US breach of a deal versus some immediate benefits Iran may gain after that deal. The past experience strongly suggests to Iran that the US violation of its commitments is a foregone eventuality. Yet, the heavy pressures of sanctions and the prospects of their increase dictate to Iran not to leave the deal altogether and to take a cooperative posture.

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Disposal, Destruction and Disarmament: Comparative Analysis of US Chemical Weapon and Weapons Plutonium Stockpile Reductions

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Abstract

The elimination of stockpiled weaponry constitutes a key step in arms control and disarmament processes, lending permanence and irreversibility to arms reductions. Yet it has proven challenging in practice. The destruction of advanced weapon components, like lethal chemical agents and the fissile materials from which nuclear weapons are constructed, is often technically complex and costly. To elucidate the dynamics of this back-end of arms control and disarmament processes, this article compares two representative cases involving analogous challenges but divergent outcomes: the nearly complete elimination of the US chemical weapon stockpile and stalled efforts to shrink the US weapons plutonium stockpile. Drawing from both engineering and organisation theory, technical and social distinctions between these efforts are assessed to identify key factors governing their outcomes. This analysis shows that the technical bases for stockpile reductions were broadly analogous between the two cases, and thus fail to explain their divergence. Rather, differing organisational characteristics among the responsible institutions proved decisive. These fostered either adaptive (in the chemical weapon case) or path-dependent (in the weapons plutonium case) organisational planning, influencing the ability of the

responsible entities to pivot from stockpile maintenance to an unfamiliar reductions mission.

Introduction

Arms control commonly entails cooperation between states to constrain the development, production, proliferation, use or stockpiling of weapons (Bull 1961: vii). Limitation of the first four activities is easily envisioned, requiring only that a state refrain from actively creating, distributing or wielding arms. Addressing preexisting weapon stockpiles is more challenging, requiring not merely abstention, but the active disposal or destruction of these weapons—the reversion of what is typically a demanding weapons acquisition process. While challenging, this elimination of stockpiled weaponry constitutes a key aspect of arms reductions and disarmament processes, lending permanence and irreversibility to these efforts (Cliff, Elbahtimy & Persbo 2018).

Despite its difficulty, history is replete with examples of successful weapon stockpile reductions. In perhaps the earliest instance, Carthage slaughtered its war elephants following a 201 BCE treaty with Rome (Burstein 1992). More recently, major powers have destroyed warships, missiles, tanks and other tools of war under the terms of the 1922 Washington Naval Treaty, the 1987 Intermediate-Range Nuclear Forces Treaty and the 1990 Treaty on Conventional Armed Forces in Europe. While these reductions targeted diverse weapons systems, they were achieved by similar, facile means: disassembly.[1]

The synthesis and weaponisation of advanced materials—the fissile materials used in nuclear weapons, lethal chemical agents and biological warfare agents, for example—has introduced new complications to this endeavor.[2] While conventional arms can often be effectively neutralised by disassembly, these advanced materials cannot; their weaponisability is primarily embodied not in the assembly of armaments, but in the initial synthesis of the exotic materials that serve as the central ingredients of nuclear, chemical and biological arms. For example, the dismantlement of a nuclear warhead does little to diminish the military utility of the fissile plutonium contained therein, and that plutonium represents the majority of the labour and expense of nuclear weapon production (Tylor 1989: 4-5).

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1   I adopt here a broad definition of 'disassembly' in the case of war elephants.
2   Fissile materials are those which can sustain a nuclear fission chain reaction. Two specific fissile materials, weapons-plutonium and highly-enriched uranium, comprise the basis for modern nuclear explosives.

Unlike simple disassembly, methods for the disposal or destruction of advanced weapon materials are often costly and technically complex.

While a large body of work in the security studies literature addresses the factors that might prompt arms reductions efforts—norm development, the negotiation of legal instruments and public support for weapons bans, for example—the ensuing logistics of stockpile management and elimination have been largely neglected.[3] A better understanding of these latter stages of arms limitations and disarmament processes as they relate to advanced weapons systems is needed, since prior programmes have met with mixed success. For example, even the world's sole case of complete renunciation of nuclear weaponry—South Africa's dismantlement of their small arsenal starting in 1990—has not led to elimination of the corresponding fissile material. South Africa still retains a portion of this inventory.[4] Global inventories of weapons plutonium have grown monotonically for decades, even as many states have ceased production and declared large portions of their stockpiles excess to military needs (International Panel on Fissile Materials 2015: 23-28). Furthermore, reducing stockpiles of advanced weaponry will likely be a central concern of security policy in the near future. For instance, addressing stockpiles of fissile materials is a key issue for advocates of the recent Treaty on the Prohibition of Nuclear Weapons, which bans the possession of nuclear arms (Shea 2018). And while many nations' arsenals of chemical weapons have been eliminated, North Korea possesses several thousand tonnes of lethal chemical agents that must be dealt with if risks are to be reduced on the Korean Peninsula (Varriale 2018).

To better elucidate the dynamics of advanced weapon stockpile reductions and the determinants of their success, this article problematises the act of stockpile reductions in the wake of an arms control agreement, asking how a state proceeds once it has chosen to pursue reductions and what factors—material or social—play central roles in the completion or failure of that mission. Given the paucity of available data on reduction efforts and of prior analysis, this work constitutes an initial, exploratory investigation, making use of a comparative case study approach to identify key bifurcations in cases with broad similarities yet divergent outcomes (Weatherbee 2012). By identifying critical junctures in

3   Much of this literature deals with nuclear weapons, chemical weapons, biological weapons, landmines and cluster munitions, all of which have been the focus of concerted international disarmament activity (Egeland 2022; Gibbons 2018; Lodgaard 2017; Hynek & Smetana 2016; Petrova 2016; Kelleher & Reppy 2011; Borrie 2009; Koblenz 2009; Perkovich & Acton 2009; Anderson 2000; Price 1997). The limited prior work that specifically investigates stockpile reductions focuses mainly on cases wherein one state compels and oversees the elimination of another state's arsenal (Tal-shir & Mitz 2018; Bleek, Kane & Pollack 2016).

4   A portion of the inventory, estimated initially at several hundred kilograms of highly-enriched uranium, has been converted for use in civilian applications (Feiveson et al. 2014: 65-67).

the histories of these cases, the relative explanatory power of potential explanations for their outcomes can be assessed.

In selecting cases with broad similarities but disparate outcomes, US efforts to eliminate chemical weapons and excess weapons plutonium stand out. US chemical disarmament is nearing completion, with more than 95% of the inventory eliminated (Quinn 2022). Meanwhile, the plutonium stockpile remains undiminished, with analysts characterising reduction efforts as a 'failure' (Hyatt 2018; Kenausis 2018; Lubkin 2018; Maloney 2019). These cases are particularly interesting from an analytical perspective because, while many facile explanations for their divergent outcomes might be imagined—differences in cost, complexity or political interest, for example—these fail to adequately explain the divergence. Both programmes, which targeted legacies of rampant Cold War production, were plagued by near-identical cost growth, with eventual projected costs of roughly $40 billion dollars (Walker 2010; Aerospace Corporation 2015).[5] They presented analogous technical challenges involving the use of well-established chemical and nuclear engineering processes, but at a much larger scale than the US had dealt with previously. And in neither case did the US appear disinterested in the outcome; it actively negotiated and signed binding international legal instruments requiring stockpile reductions in both cases, and subsequently spent billions of dollars in the pursuit of those reductions.[6]

It is this surprising similarity between the two programmes, as well as the availability of extensive documentation of both, that makes them attractive targets for exploratory investigation of the sociotechnical dynamics of weapons stockpile reductions. Why, despite facing similar obstacles, was reduction of the chemical weapon stockpile successful, while attempts to reduce the weapons plutonium stockpile have stalled? What factors—technical or social—shaped the outcomes of these efforts?

This article examines the histories of US chemical weapon and weapons plutonium stockpile reduction efforts in order to elucidate the causes of their divergent outcomes. Because reductions are an inherently technical activity carried out by large, bureaucratic organisations, both technical and organisational aspects of each case are considered. This analysis ultimately demonstrates that technical factors and material characteristics of these weapon systems were not the primary determinants of stockpile reductions outcomes. The technical challenges faced in each case and the associated costs were comparable, such that neither stockpile was intrinsically more amenable to elimination. Rather, organisational path-dependence—a tendency to favour repetition over innova-

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5   Dollar amounts are given in 2022 dollars throughout the text.
6   Approximately $6 billion was spent on the plutonium effort before it unraveled (US Department of Energy 2014a: 22; Holt & Nikitin 2017). Expenditure to date on the chemical weapon destruction effort is much higher, given its greater progress.

tion—proved decisive. It hindered the adoption of novel elimination techniques in the plutonium case, while circumstances favouring organisational adaptation facilitated a successful pivot from stockpile maintenance to elimination in the chemical agent case.

The remainder of this article proceeds as follows. The first section provide brief historical surveys of US chemical weapon and weapons plutonium stockpile reductions efforts. The second section examines the technical bases for elimination, proposing a simple typology of reductions techniques and comparing the associated technical challenges. The third section assesses the social contexts of reductions and the influence of organisational heuristics on stockpile management practices. The article concludes with discussion of the policy implications of these findings and of their potential for generalisation to the analysis of other stockpile reductions efforts.

A brief history of US chemical weapon and weapons plutonium reductions

Chemical weapons

Following the widespread use of chemical weapons in World War I, the US acted as a primary champion of chemical arms control. Concerns about the indiscriminate nature of these arms and their potential use against noncombatants, their association with the unpopular German government and a moral repugnance regarding their effects on soldiers combined to generate opposition amongst both the public and political elites (Price 1997: 46-47). In 1925 the United States signed the Geneva Protocol, which banned the first use of these weapons.[7] Nevertheless, it readied itself for widespread chemical warfare in World War II, then continued development and stockpiling of chemical agents and munitions as part of the US-Soviet arms race (Moon 1984; Tucker 2006: 122-189). Only in 1968 was production halted.[8]

This left the United States with a vast chemical stockpile, consisting primarily of the nerve agents GA (tabun), GB (sarin) and VX, alongside the vesicants lewisite and the sulfur mustards (US National Research Council 1984: 1; US Office of Technology Assessment 1992: 13-14).[9] These liquid agents were contained in both artillery shells and one-ton containers, distributed among nine depots in the continental United States and Johnston Atoll.[10]

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7   While failing to ratify for half a century, the United States upheld the treaty's stipulations as a matter of policy.
8   The United States took steps to produce binary chemical munitions—containing non-lethal chemicals that are mixed upon firing to produce a lethal agent—in the 1980s.
9   Nerve agents disrupt the working of the human nervous system, while vesicants attack the skin, eyes and mucous membranes.
10 Designation of chemical weapons as 'poison gases' is a misnomer. On the battlefield,

While no large-scale or systematic elimination programme existed at the time, aging of the stockpile necessitated periodic disposal of small quantities of agents and munitions, constituting the earliest US chemical weapon stockpile reductions. Absent a legal obligation for elimination or strict political oversight, the Army Chemical Corps opted for cheap, rudimentary methods of disposal. Prior to 1970, these agents were treated much the same as any other form of refuse; burning in open pits, release to the atmosphere, burial and ocean dumping were typical. The latter method culminated in Operation CHASE (Cut Holes And Sink 'Em) in which, from 1964 to 1970, hundreds of tonnes of agents and munitions were loaded onto ships that were subsequently scuttled in the Atlantic Ocean (Flamm, Kwan & McNulty 1987). Public outcry eventually halted the programme after details of this dumping were leaked to the US Congress and the media (Wagner 2004: 311-312).

Finding its preferred approach demonised on environmental grounds, in 1969 the Department of Defense (DOD) commissioned the US National Academy of Sciences (NAS) to review Operation CHASE. The NAS recommended substitution of ocean dumping with two technologically advanced methods of agent destruction: incineration and chemical neutralisation (US National Academy of Sciences 1969). Incineration entails extraction of agents from the containers in which they are stored, followed by heating in large furnaces (US National Research Council 1984: 73-80). Combustion of the agents renders them less toxic, such that the products can be vented to the atmosphere or disposed of as hazardous waste. Neutralisation involves mixing of agents with other chemicals that react with the agent to yield less toxic products, which can then be disposed of. For example, GB and VX can by neutralised by mixing with large volumes of water and sodium hydroxide, a common industrial chemical (US National Research Council 1984: 26-33). Adopting these NAS recommendations, the Army tested both incineration and neutralisation throughout the 1970s. The latter method fared poorly and was abandoned by the 1980s due to 'the sheer complexity of the process', while incineration became the preferred means of elimination (Flamm, Kwan & McNulty 1987: 8).

In parallel to this evolution of the means of chemical weapon elimination the United States developed a legal context for stockpile reductions. In 1982, the NAS outlined a plan for incineration of the entire stockpile (US National Research Council 1984: 68). In 1985, Congress tasked the DOD with this mission, marking the official start of the systematic chemical stockpile reductions programme (US Congress 1986). The process was bilateralised under the 1990 US-Soviet Chemical Weapons Accord, which limited each state to 5000 tonnes of agents. It was multilateralised three years later when the United States signed

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these liquids are dispersed as a fine mist. The chlorine-based gases (e.g., chlorine and phosgene) are an exception.

the Chemical Weapons Convention (CWC), obliging it to destroy the entirety of its chemical arsenal and to refrain from further production.

However, this flourishing of the international context for reductions was accompanied by recurrent delays and financial failings in the US programme. In its 1984 report, the NAS predicted a total cost of $3.8 billion (all figures are given in 2022 dollars) for elimination of the stockpile, while the Army estimated $4.5 billion and completion by 1997 (US National Research Council 1984: 4-5, 92-94; US General Accounting Office 1985). By 1991, these projections had increased to $12.6 billion and completion by 1999 (US General Accounting Office 1991: 3). Six years later this was again revised to $22 billion (US General Accounting Office 1997: 7). And the Army's woes were not merely financial. Opponents in local and state governments, as well as environmental groups, argued that the Army had inadequately studied both the risks to nearby communities from gases released during incineration and the relative environmental risks of alternative disposal methods (US Office of Technology Assessment 1992: 3-4, 18-20).

Responding to these concerns, in 1996 the Army launched the Assembled Chemical Weapons Alternatives (ACWA) programme to assess and implement new means of elimination. Its adoption of the challenging neutralisation approach has further increased costs and delayed the programme. Current projections anticipate completion no sooner than 2023, a dramatic overrun of the 2007 CWC deadline (Lewis 2013). Estimates peg final programme costs at roughly $40 billion, a more than twenty-fold increase from initial projections (Walker 2010).

Despite suffering from seemingly interminable delays and exorbitant costs, the chemical disarmament programme appears poised to meet its goal. The DOD has thus far acquired sustained congressional funding. Inventories at seven of the nine US depots have been fully incinerated, while ACWA-run neutralisation programmes are underway at the final two sites (Quinn 2022). There remain several obstacles to the complete elimination of the US chemical arsenal—many of the remaining munitions are severely degraded, complicating agent extraction, and local communities are often opposed to this work—yet the destruction processes in use have been extensively and successfully demonstrated. This outcome stands in stark contrast to the US experience with weapons plutonium wherein, despite analogous challenges, it has failed to eliminate even a small fraction of this stockpile.

Weapons plutonium

The United States first sought to limit the stockpiling of weapons plutonium—an artificial, radioactive metal and a central ingredient of nuclear weaponry—in 1946, just three years after the first synthesis of this material (Barnard et al. 1946). Its proposal to place existing stocks under international control was

rejected by the Soviet Union, which was then pursuing its own plutonium production capability (Wheeler 2002: 23). Soviet acquisition of plutonium in 1949 positioned fissile materials as a centrepiece of the bipolar, US-Soviet deterrence relationship. In this context the United States pursued rampant production throughout the Cold War, continuing to enlarge its stockpile until 1988. By this point it was left with nearly 100 metric tonnes of weapons plutonium, enough for tens of thousands of nuclear weapons (International Panel on Fissile Materials 2015: 23-25).

The dissolution of the Soviet Union in 1991 prompted a dramatic shift in the nuclear security landscape. Previously, most bilateral arms limitations had focused on warhead delivery systems (e.g., missiles and bomber aircraft) rather than fissile materials, due in part to the difficulty of monitoring and accounting for the latter (von Hippel, Albright & Levi 1986: 1). But concerns regarding the security of the Russian stockpile amidst political and economic upheaval brought nuclear material management to the forefront (Perkovich 1993). In this environment, US policymakers came to perceive the very existence of plutonium stockpiles, and the accompanying risk of theft by non-state actors, as an inherent security threat. International negotiation began on a Fissile Material Cutoff Treaty (FMCT) that would ban further plutonium production. In tandem, the United States and Russia, possessing the vast majority of the global weapons plutonium inventory, began to explore bilateral approaches to reducing the sizes of their stockpiles.

The two sides quickly reached agreement on plans to reduce stockpiles of one of the two most commonly-used fissile materials: highly enriched uranium. The enrichment process that renders this fissile material useful for weapons purposes can be undone by simple blending with unenriched uranium extracted from natural ores.[11] Plutonium stockpile reductions posed a greater challenge, as plutonium does not require the same enrichment prior to use in a weapon.

In 1992 the NAS convened discussions on plutonium stockpile reductions with its counterpart, the Russian Academy of Sciences. The Bush administration then tasked the NAS with a comprehensive technical study of reductions prospects, published in 1994 (US National Academy of Sciences 1994). This report shaped the contours of future reductions efforts. Crucially, it argued that the best approaches to elimination were those that rendered weapons plutonium as unattractive for use in a weapon as is the vast quantity of plutonium found in spent nuclear fuel from civilian reactors.[12] Given that the plutonium in spent

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11   Several hundred tonnes of US and Russian highly enriched uranium have since been eliminated via downblending (Pavlov & Rybachenkov 2013).

12   This inventory constitutes a few thousand tonnes of plutonium (International Atomic Energy Agency 2017: 10).

fuel is unlikely to be eliminated in the near future and will therefore remain a potential target for diversion or theft, this 'spent fuel standard' represents the maximum meaningful level of irreversibility that might be achieved in the near term.

The weaponisation of plutonium contained in spent nuclear fuel is hindered, to some extent, by both its dilution in a highly radioactive mixture of non-weaponizable material and its relatively high concentration of certain isotopes of plutonium (referring to varieties of plutonium with different numbers of subatomic particles, and thus different nuclear properties) produced by long-term exposure to radiation within a nuclear reactor.[13] Plutonium containing high concentrations of these isotopes, known as reactor-grade plutonium, is somewhat less attractive for weapons use. To mimic these conditions with weapons plutonium, the NAS recommended two potential methods: conversion of weapons plutonium to nuclear fuel followed by irradiation in a nuclear reactor, or immobilisation in a highly-radioactive mixture of materials (US National Academy of Sciences 1994: 220-230).

The first method involves mixing of plutonium with uranium dioxide—the most common commercial nuclear fuel—and irradiation of the resulting uranium-plutonium fuel. This yields highly radioactive spent fuel with unfavourable plutonium isotopic composition. While uncommon in commercial nuclear energy programmes, this technique relies on well-established technologies. It has been practiced routinely, cost-efficiently and at industrial scale in France since the 1970s (Paviet-Hartmann, Benedict & Lineberry 2009: 332).[14] The second method, immobilisation, entails mixing of the plutonium with preexisting radioactive nuclear waste so as to mimic the dilution of plutonium in spent nuclear fuel, but without altering its isotopic composition.

Armed with this vision of cooperative stockpile reductions, bilateral consultation soon reached the highest levels of the US and Russian governments. Discussion between Presidents Clinton and Yeltsin at the 1996 Moscow Nuclear Safety and Security Summit was followed by a declaration emphasising the pressing need for excess plutonium to be 'transformed into spent fuel or other forms equally unusable for nuclear weapons' (International Atomic Energy Agency 1996). The US Department of Energy (DOE), responsible for managing the US fissile material stockpile, soon began preparations for carrying out this reductions mission (US Department of Energy 1996).

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13   Weapons using reactor-grade plutonium are less reliable and produce lower explosive yields than those using similar quantities of weapons plutonium. The precise influence of isotopic composition on weaponisability is controversial (Mark, von Hippel & Lyman 2009; Pellaud 2002).

14   While costs may be somewhat higher than direct disposal of nuclear fuel without plutonium reprocessing, the French government maintains that reprocessing increases energy costs by only a few percent (Charpin, Dessus & Pellat 2000).

By 2000, the United States and Russia had negotiated and signed the Pluto-nium Management and Disposition Agreement (PMDA), requiring each to elim-inate 34 metric tonnes of weapons plutonium and to refrain from the produc-tion of new material until finished.[15] The technical means of elimination proved a point of contention. Russia showed little enthusiasm for immobilisation, de-riding it as 'just another form of storage' that, because it did not change the isotopic composition of the plutonium, would leave plutonium vulnerable to retrieval and reuse were the United States to renege on its commitments (Bunn 2007). Thus, the PMDA mandated conversion to nuclear fuel and irradiation for the bulk of the plutonium it addressed (Clements, Lymann & von Hippel 2013).[16] With this technical stumbling block overcome, there emerged a clear path for-ward for international cooperation on stockpile reduction.

As in the chemical weapon case, this progress was soon marred by delays and rapidly escalating cost projections, which came to overshadow concerns of re-duction irreversibility in the US discourse. In 2002 the DOE projected a cost of $6 billion (all figures are given in 2022 dollars) for conversion of the plutonium to nuclear fuel by approximately 2020 (US National Nuclear Security Administra-tion 2002). By 2015, forecasts had ballooned to at least $37 billion for completion in 2059, as the DOE found construction of the necessary conversion infrastruc-ture to be more complex than anticipated (Aerospace Corporation 2015; Lubkin 2018). The US commitment to its PMDA obligations floundered in the face of these cost overruns. The DOE convened a series of working groups to unilater-ally assess cheaper, alternative elimination methods (US Department of Energy 2014b; Aerospace Corporation 2015; Oak Ridge National Laboratory 2015). They recommended an approach distinct from those identified in the earlier NAS re-port: dilution of plutonium in a non-radioactive material and burial deep under-ground in a geologic repository. The DOE formally adopted this method in 2016 (US Department of Energy 2016: 6).

This pivot to dilution and burial ran afoul of the long-held Russian oppo-sition to such techniques and, without Russian assent, contravened the terms of the PMDA. President Putin swiftly voiced concern that buried plutonium could 'be retrieved, reprocessed, and converted into weapons-grade plutonium again' (President of the Russian Federation 2016a). In 2016 he suspended Rus-sia's commitment to the PMDA citing, among other grievances, 'the inability of the United States of America to ensure the fulfillment of its obligations on the disposition of surplus weapons-grade plutonium' (President of the Russian Fed-

15 This moratorium on production built on a bilateral 1994 agreement mandating the shutdown of certain plutonium production reactors.
16 The agreement allowed for a small portion of US plutonium to be disposed of by im-mobilisation, a strategy later abandoned on budgetary grounds. A 2010 renegotiation of the PMDA allowed Russia to irradiate plutonium in newly developed fast reactors, rather than the light water reactors specified in the initial agreement.

eration 2016b). This ended what the US Congress had earlier described as 'one of the most important nonproliferation initiatives undertaken between the United States and Russia' (US House of Representatives 2001: 131).

Much of this history mirrors that of the chemical weapon stockpile: the accumulation of vast inventories for deterrence purposes, vacillation between multiple elimination techniques, and financial challenges that threaten the reductions endeavor. Yet while the United States has nearly met its obligations under the CWC, the international context for plutonium stockpile reductions has unraveled. While the PMDA mandated US reduction of its weapons plutonium stockpile fifteen years after the US Congress mandated the elimination of the chemical weapons stockpile, the plutonium programme is far less developed than the chemical disarmament effort was fifteen years ago. No weapons plutonium has been eliminated from the US inventory to date and prospects for further bilateral progress are meagre. The United States is poised to carry out any future unilateral reductions via a highly contentious, allegedly reversible means.[17] In seeking to identify the sources of this divergence in outcome, this article looks first to the weapon materials and the technical bases for their elimination.

The technical basis for stockpile reductions

The most obvious distinction between chemical weapon and weapons plutonium stockpile reductions is the nature of the material being eliminated. Thus, the immediate question is this: did fundamental characteristics of these weapon materials and the means by which they can be eliminated determine the divergent outcomes of reductions efforts? Did some property of weapons plutonium, absent from chemical agents and munitions, preclude its successful elimination?

Chemical agents and weapons plutonium are physically and chemically dissimilar. Chemical agents are predominantly liquids composed of complex organic molecules (specific combinations of atoms bound to one another in a unique arrangement) (Stockholm International Peace Research Institute 1971b: 22-59). Their constituent chemical elements are relatively common and harmless in isolation (for example, carbon, oxygen, fluorine, phosphorus, sulfur and nitrogen); it is the bonding of these atoms to one another in a particular molecular structure (e.g., $C_5H_{11}N_2O_2P$ for the nerve agent tabun) that lends them lethality and efficacy as tools of war.

In contrast, weapons plutonium is a solid metal composed of only a single, artificial chemical element: plutonium (Clark, Gleeson & Hanrahan 2019). Plutonium weapon components consist of a large number of plutonium atoms bound

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17   The reversibility of burial is a topic of controversy (Lyman & Feiveson 1998; Peterson 1999).

to one another.[18] It is not any particular arrangement of atoms that lends this material its military efficacy, but rather the initial synthesis of this chemical element within a nuclear reactor.

These essential distinctions between molecular chemical agents and single-element weapons plutonium govern the manner in which these materials can be eliminated. Chemical agents can be effectively destroyed by chemical means: breaking of their constituent chemical bonds such that the individual atoms making up the lethal molecule remain intact, but the molecule itself is destroyed. Incineration and neutralisation accomplish this by driving chemical reactions with hot air or with other chemicals that decompose agents into less-lethal—yet often still highly toxic—reaction products, such as hydrofluoric acid or methylphosphonic acid (US National Research Council 1984: 68-83).

Plutonium cannot be chemically decomposed, as it consists of only a single chemical element. Instead nuclear alteration (the decomposition or modification of the atoms themselves) is required to fully eliminate this material. Conversion of weapons plutonium to nuclear fuel and irradiation in a nuclear reactor—the means of stockpile reductions dictated by the PMDA—accomplishes this (US National Academy of Sciences 1994: 154-159). When placed in an operating nuclear reactor, this material is bombarded with neutrons, a type of subatomic particle. If impacted by a neutron of sufficient energy, a plutonium atom can split into two fragments, each of which is a different chemical element. Alternatively, it can absorb the neutron and transition into a different isotope of plutonium (US National Academy of Sciences 1995: 27-43). In the former case, plutonium is converted or decomposed into non-weaponizable elements like ruthenium and iodine (Katcoff 1958). In the latter, neutron absorption by the isotope plutonium-239 produces plutonium-240, an isotope that is somewhat less amenable to weaponisation (US National Academy of Sciences 1994: 32-33).[19]

Both chemical weapon and weapons plutonium stockpile reductions efforts have also made use of other, non-destructive reductions techniques. Chemical weapon reductions began with the dumping of munitions and agent tanks into the Atlantic Ocean, an approach which relies on the difficulty of recovery from the sea floor to prevent reuse. Similarly, the recently proposed dilution and burial of plutonium would leave this material largely intact, relying on chemical dilution and subterranean isolation to prevent reuse.

This analysis reveals a correspondence between the means of chemical weapon and weapons plutonium elimination. The various techniques utilised in both cases can be grouped into two broad categories: destruction and disposal. De-

18 Small quantities of other elements, such as gallium, are added to enhance plutonium's physical properties.
19 Irradiation will simultaneously breed new plutonium, rich in plutonium-240, from uranium present in the fuel.

struction entails alteration of the material via some form of decomposition so as to render it intrinsically less attractive for weapon use. The incineration or neutralisation of chemical agents and the irradiation of weapons plutonium are thus both means of material destruction that represent, to some extent, reversion of the synthesis processes that initially produced these materials.[20] These methods are analogous to the disassembly techniques used for elimination of conventional weapon systems; like deconstructing a tank, heating of a chemical agent 'disassembles' weaponised molecules and irradiation of plutonium 'disassembles' weaponised atoms. Given its technical complexity, destruction tends to be relatively expensive, but highly irreversible.

Disposal involves no substantial alteration of the material itself, but rather the establishment of extrinsic barriers to its recovery and reuse. Ocean dumping and burial are thus means of disposal, as they rely on hundreds of meters of overlying seawater or rock to render recovery expensive, slow and observable. Disposal tends to be cheap relative to destruction, since it entails widely practiced activities such as ocean transport and geologic excavation. For example, the switch from ocean dumping of chemical munitions to incineration increased costs severalfold (Ripley 1971). Likewise, cost projections for irradiation of weapons plutonium are substantially higher than those of burial (Aerospace Corporation 2015). Yet this cost advantage is counterbalanced by the potential for material recovery. Because disposal does not alter the intrinsic characteristics of weapon materials, reversion of this process remains possible, assuming the costs of recovery are low relative to the material's value.

In light of this tension between recovery cost and use-value, it is instructive to quantitatively assess both. Recovery of chemical weapons disposed of on the sea floor would require a deep ocean salvage operation, typically costing up to tens of millions of dollars (Bartholomew & Milwee 2009).[21] This is a high price for the recovery of agents that can be synthesised for a few dollars per kilogram (Stockholm International Peace Research Institute 1971b: 53). It is also high relative to the military utility of these weapons on a per unit mass basis. The US chemical weapons stockpile consists mainly of mortar projectiles containing a few kilograms of chemical agent each (US Department of the Army 1977). Under ideal weather and delivery conditions, a single munition can disperse agent over a roughly 10,000 square meter area (US Departments of the Army, the Navy and the Air Force 1966). Assuming dense packing of enemy combatants and the absence of chemical defenses such as gas masks, a few kilograms of agent might yield up to several hundred casualties.

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20 In both cases, the products of destruction could be weaponised, but would be intrinsically less effective than the initial materials.
21 Surveys of dumped chemical munitions indicate that they remain largely intact, and therefore recoverable (Silva & Chock 2016).

The costs of recovering buried weapons plutonium are similar. Mining of a geologic repository would cost up to approximately ten million dollars (Peterson 1999). For a repository containing tens of metric tonnes of weapons plutonium, this would yield recovery costs of perhaps a few thousand dollars per kilogram of plutonium, even assuming a conservative recovered fraction on the order of 10%. This cost is quite low compared to that of producing new plutonium from the irradiation of nuclear fuel in a nuclear reactor and subsequent separation of the plutonium produced. One estimate predicts costs to separate plutonium from spent nuclear fuel in excess of one hundred thousand dollars per kilogram of plutonium (Berkhaut et al. 1993: 200).

In contrast to the chemical weapon case, the low cost associated with recovery of buried plutonium is dwarfed by this material's tremendous destructive power. Less than ten kilograms of plutonium—a sphere slightly larger than a baseball—is sufficient to produce a nuclear explosive device (International Atomic Energy Agency 2002: 23). The bomb dropped on Nagasaki in 1945, for example, contained 6.4 kilograms of plutonium and produced a blast yield equivalent to approximately 22 kilotons of TNT (Penney, Samuels & Scorgie 1970). Detonation of such a device in a major city would yield hundreds of thousands of casualties.

This clear nonequivalence in the cost/value relations for chemical weapons and weapons plutonium reveals a corresponding nonequivalence in the efficacy of disposal as a means of elimination. While disposal strongly disincentivises the reuse of chemical agents, since the costs of recovery are high relative to both the costs of producing new agents and to their military use-value, its efficacy in the plutonium case is questionable.

This simple typology of the technical bases for stockpile reductions yields two key findings. First, comparable means of destruction and disposal exist for both chemical weapons and weapons plutonium. No intrinsic property of weapons plutonium precluded successful implementation by the United States of its PMDA obligations at costs comparable to those deemed acceptable for chemical stockpile reduction. Thus, the characteristics of these weapon materials and the technical bases for their elimination fail to explain the divergent outcomes of the associated reductions efforts. Second, these two cases evolved along opposing paths. Chemical disarmament proceeded from effective disposal (e.g., ocean dumping) to more costly destruction (incineration and chemical neutralisation). Conversely, plutonium stockpile reduction efforts shifted from destruction (conversion to nuclear fuel and irradiation in nuclear reactors) to cheaper and potentially less effective disposal (dilution and burial)—a shift which prompted the eventual downfall of the PMDA. This distinction raises new questions regarding strategic decision-making by the organisations responsible for reduc-

tions. The roles these organisations played through selection and implementation of the means of stockpile reductions are addressed next.

Organisational factors in stockpile reductions
Organisational heuristics and path-dependence
With technical factors failing to fully explain the divergent outcomes of these stockpile reductions efforts, their broader social contexts must be considered. Highlighting the role that organisational interests can play, Wyn Jones characterises the stockpiling of these weapons as 'the result of a rather fragile interplay of professional, technical, economic, and political factors and the product of a coalition of interests and alliances that will disintegrate if not constantly reproduced' (Wyn Jones 1999: 143). The central question is this: did differing organisational interests govern the outcomes of these stockpile reductions efforts?

These efforts were carried out by organisations with distinct institutional histories, capabilities and preferences: the DOD's Department of the Army, Chemical Demilitarization Program managed the chemical stockpile, while weapons plutonium was the purview of the DOE's National Nuclear Security Administration (NNSA), Office of Material Management and Minimization.[22] Both were tasked with costly, technically complex reductions missions that ran directly counter to the prior work of their parent organisations producing and maintaining these stockpiles. This necessitated broad organisational change and adaptation—a challenge for any large bureaucracy (Van De Ven & Poole 1995).

Organisational characteristics shape the heuristics decision-makers employ when confronted with the need to solve newly encountered problems. Organisation theory identifies common heuristics that bureaucratic organisations typically follow in these instances. In their seminal work, March and Simon found that organisations tend to approach new problems by 'recognizing a situation as being of a familiar, frequently encountered, type, and matching the recognized situation to a set of rules' established in prior problem-solving (March & Simon 1993: 8). This gives rise to path-dependence, wherein strategy is characterised by the reproduction and synthesis of past actions; 'adaptation takes place through a recombination of lower-level programs that are already in existence' (March & Simon 1993: 171). Thus, the programmes or routines that an organisation has previously engaged in—developing relevant experience and capabilities—comprise a semi-exclusive range of options available to decision-makers when confronted with a new problem. Courses of action that align with prior experience tend to appear 'sensible or even inevitable', while alternatives appear radical or infeasible (Eden 2004: 50).

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22 Organisational nomenclature changed throughout both programmes.

This reliance on reproduction confers several benefits to bureaucratic organisations. Routinisation of problem-solving and strategic planning allows for the efficient dispersal of institutional knowledge and ensures that the resources necessary to develop new capabilities are mustered only when necessary (March & Simon 1993: 163-190). Yet it can also 'constrain optimal choice in order to achieve the efficiencies of established routines' (Allison & Zelikow 1999: 156). Routines become self-reinforcing as investment in corresponding capabilities and infrastructure ensures that, from the perspective of those in an organisation, 'the relative benefits of the current activity compared with other possible options increase over time' (Pierson 2000: 254). Thus, characteristics of the organisation itself, rather than those of the problem to be solved, can dominate the strategy selection process. In extreme cases, this tendency to gravitate towards familiar strategies can yield technological monocultures in which specific technologies are favored despite glaring shortcomings (Walker 2000). This can detrimentally influence organisational performance in activities that involve complex technologies and unfamiliar objectives, such as stockpile reduction. In the words of Allison and Zelikow, 'projects that demand that existing organizational units depart from their established programs to perform unprogrammed tasks are rarely accomplished in their designed form' (Allison & Zelikow 1999: 179).

Adding to this challenge, the governmental organisations responsible for management of weapon stockpiles act within a complex web of political interests, both domestic and international. The institutionalist school of organisation theory identifies this broader sociopolitical environment as a key factor shaping the development of organisational routines since, to some extent, 'the rules' that an organisation follows in problem-solving 'are formed in the state or even world system, external and hierarchically superior to the organization' (Zucker 1987: 450). This institutional context—in this case the contemporary security environment and dominant discourses in state security culture—can further 'explain departures from technical rationality' (Eleanor Westney 1993: 54). Along these lines, prior work has demonstrated the key role of ideational forces and social network effects in the persistence of nuclear weapon systems in several states (Ritchie 2010; Bourne 2016; Adamsky 2019). In a recent, comprehensive study of disarmament processes Egeland summarises the often decisive role of these normative factors when observing that disarmament is, in nearly all instances, 'precipitated by the . . . emergence of new conceptions of appropriate action' (Egeland 2022: 122).

Organisational sclerosis in the plutonium stockpile reductions effort
Tensions between organisational routinisation and mission novelty are evident in the weapons plutonium case. Prior to the PMDA, the DOE had little experi-

ence with the production and use of plutonium-bearing nuclear fuel, the elimination method mandated by the agreement. Limited US testing of this technology in the 1970s was halted by a 1977 federal moratorium, based on fears that normalisation of plutonium use in civilian applications would hasten the proliferation of nuclear weaponry (von Hippel 2001). This ban was lifted in 1981, but commercial and research interest proved minimal given the low cost of conventional, uranium-based nuclear fuel (Bunn et al. 2005). Unlike in other nations, most prominently France, plutonium was not adopted as a fuel for US nuclear reactors. So unfamiliar was the DOE with plutonium fuel technology that, when tasked with the conversion of weapons plutonium to fuel under the PMDA, it had to rely heavily on a subsidiary of Areva, the French state-owned nuclear firm, for design and construction services (Lubkin 2018).

In contrast, the DOE possessed extensive experience with nuclear waste dilution and burial. Since the earliest days of nuclear energy there has existed a consensus in the United States that disposal in stable geologic formations is the best means of dealing with unwanted nuclear materials (US National Research Council 1957). The 1982 Nuclear Waste Policy Act codified in law the government's commitment to geologic disposal. But perhaps the most meaningful expression of the DOE's adherence to burial is found in its infrastructure. Since 1999 the DOE has operated WIPP, the world's only deep geologic repository for nuclear waste, into which it plans to invest upwards of $20 billion (Feder 1999).

Under these conditions, typical organisational heuristics would strongly favour abandonment of the irradiation approach, an unfamiliar technique imposed by external political forces, and its substitution with dilution and burial, an approach that aligns with existing capabilities and capitalises on prior investments. The DOE's swift reversion to its preexisting waste management routine aligns with an organisational preference for more familiar alternatives to irradiation. Just one year after the PMDA's signing, the US Congress chided the department for 'consideration of alternative plutonium disposition and management scenarios', mainly dilution and burial, alongside a 'much lower than expected budget request' (US House of Representatives 2001: 131).

The DOE's apathetic approach to plutonium irradiation bordered on self-sabotage. After failing to request from Congress the requisite appropriations, the department commissioned a succession of reports claiming inadequate funding for the irradiation technique and suggesting its replacement with burial (US Department of Energy 2014b; Aerospace Corporation 2015; Oak Ridge National Laboratory 2015). According to Congress these DOE assessments had 'not accurately represented the comparative life cycle costs of these alternatives', suggesting ancillary motives for the DOE's preference (US House of Representatives 2014: 143). The DOE's ardent pursuit of more familiar alternatives to ir-

radiation—the adoption of which scuttled the PMDA—corresponds to the predictions of organisation theory that 'damaging interactions can occur . . . when new, unfamiliar tasks are superimposed onto old routines' (Allison & Zelikow 1999: 158).[23]

These internal factors hindering organisational change within the DOE were accompanied by an evolving institutional environment that grew increasingly unconducive to stockpile reductions. Unsurprisingly, negotiation of the PMDA coincided with a reassessment of the role of nuclear weapons in global security policy. The fall of the Soviet Union did away with a primary justification for US reliance on nuclear weapons, prompting a revival of nuclear reductionist, delegitimationist and abolitionist thought (Nitze 1994; Canberra Commission on the Elimination of Nuclear Weapons 1996; US National Academy of Sciences 1997).

But support for the arsenal rebounded in subsequent decades, buoyed by a renewed focus on great power conflict and familiar deterrence relationships (Freedman & Michaels 2019: 631-648). As the PMDA unraveled, dominant US discourses reflected a belief that 'the conditions that might make possible the global elimination of nuclear weapons . . . would require a fundamental transformation of the world political order' (Congressional Commission on the Strategic Posture of the United States 2009: xvi). Perceptions of the immutability of existing nuclear postures extended to the plutonium stockpile. The 2018 US Nuclear Posture Review called for a 'sustained plutonium pit manufacturing capability needed to . . . prepare for future uncertainty' (US Department of Defense 2018: 62). This conception of stockpiled plutonium as a safeguard against unknown dangers stood in stark contrast to the stockpile reductions mission. It instead signified preoccupation with a possible 'loss of influence over what happens to be the means of supreme political potency' identified by von Meier, Miller, and Keller in their sociological study of plutonium stockpile management (von Meier, Miller & Keller 1998: 25).

In line with the institutionalist account of organisational decision-making, DOE strategy mirrored this evolution in the social framing of weapons plutonium. Documents spanning the reductions programme exhibit a corresponding shift in rhetorical focus. Early planning identified two motivations for reduc-

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23 Management issues at the NNSA may have further hindered its performance. The agency is regularly featured in the US GAO's list of federal programmes vulnerable to waste and mismanagement (US Government Accountability Office 2019: 217-221). The presence of seemingly 'built-in' resistance to execution of the plutonium stockpile reduction effort raises questions about why the US pursued reductions. Analysis by Lubkin suggests a role of principal-agent problems, wherein the interests of key actors—such as those within the US Department of State responsible for negotiating the PMDA and those within the Department of Energy responsible for implementing it—are imperfectly aligned (Lubkin 2017).

tion: 'the risk that either weapons or fissile materials could be obtained by un-authorized parties' (i.e. nonproliferation) and 'the risk that weapons or fissile materials could be reintroduced into the arsenals from which they came' (i.e. arms control) (US National Academy of Sciences 1994: 3). The former frames plutonium as an intrinsically valuable material to be protected from theft, the latter as an undesirable threat to global security that must be made inaccessible to everyone, including its current possessors. It is the arms control motivation alone that mandates permanent, irreversible elimination; nonproliferation aims could be achieved more cheaply by secure storage of plutonium to protect it from non-US actors.

In the ensuing decades, this arms control impetus faded and was eclipsed by the nonproliferation justification. A 2014 DOE report arguing for substitution of the means of disposal mandated by the PMDA spoke only of 'danger to national and international security due to proliferation concerns and potential use by non-state actors for nuclear terrorism purposes' (US Department of Energy 2014b: 7). The arms control justification, previously a central pillar of the reductions mission, was conspicuously absent.

While technical factors alone fail to explain the trajectory of the US weapons plutonium reductions effort, organisational factors exhibit substantial explanatory power. Evolution of the institutional context in which reductions were sought acted in tandem with the DOE's path-dependent tendencies to promote abandonment of the initial goal of permanent elimination by irradiation, and its substitution with a more familiar—and thus more organisationally tenable—means of disposal.

Organisational adaptation in chemical weapon stockpile reduction
In its execution of the chemical weapon stockpile reductions mission, the DOD has managed transitions between multiple unfamiliar, costly, complex elimination methods. In switching from the maintenance of chemical weapon inventories to their destruction, and from primitive forms of disposal to incineration and neutralisation, the DOD appeared remarkably unconstrained by its prior routines, willingly adopting new destruction techniques without major impairment of its chemical disarmament mission. If, according to organisation theory, reproduction of preexisting routines is the norm and the development of new capabilities is rare, what enabled the DOD to accomplish this remarkable feat of organisational adaptation?

Constant, drawing from his study of aircraft engine development, presents a facile model of institutional-technological change wherein members of an organisation are 'vectors for a specific replication code, carriers of a powerful set of programs that constitute the relevant tradition of practice' (Constant 2012: 221).

To successfully engage in new activities, some force must 'slice open an organization, insert the new vector and its programming, and presto! the organization starts replicating turbojets rather than piston engines' or, in this case, starts destroying chemical agents rather than stockpiling or dumping them (Constant 2012: 221-222). In this surgical metaphor, what driving force plays the role of the scalpel? Eden, in her analysis of nuclear war planning, posits several possibilities: the cycling of personnel, disruptive alteration of an organisation's operating environment, and the recognition of new opportunities for organisational gain (Eden 2004: 57-58, 221-226).

Assessing the chemical weapon case through this 'organisational change' lens reveals the confluence of several organisational forces that favored the department's successful adoption of a new reductions mission. There were three key factors. First, fifteen years passed between the cessation of ocean dumping and the 1985 congressional mandate for destruction of the chemical weapon stockpile. Systematic destruction did not begin until the late 1990s. The intervening decades provided sufficient time for turnover of personnel and fading of institutional experience, breaking the continuity of action on which organisational path-dependence rests (McNeil & Thompson 1971).

Second, the early stages of the destruction endeavour were punctuated by passage of the 1986 Goldwater-Nichols Act, which radically reshuffled the DOD's management structure and further cleared a path for organisational change (Lederman 1999: 33-50). The effects of this change on organisational agility are apparent in external evaluations of the Army's adaptation to the stockpile reductions mission. After the US General Accounting Office (GAO) attributed early problems with the Army's work on chemical demilitarisation to 'long-standing leadership, organizational, and strategic planning weaknesses', the Army rapidly revamped its programme management structures, garnering praise from the GAO for the alacrity with which these management failings were rectified (US General Accounting Office 2003: 12; US Government Accountability Office 2007). The Army's subsequent success in chemical weapon destruction has been broadly attributed to its ability to effectively exert centralised managerial control over the programme (Greenberg 2003).

Third, the unique nature of the DOD's financial structure incentivised the adoption of a costly stockpile reductions mission. As demonstrated by Allison's study of DOD decision-making processes, the department's behaviour is uniquely 'characterized by effective imperatives to avoid . . . a decrease in dollars budgeted' (Allison & Zelikow 1999: 169). From this perspective, the development of new technologies required for stockpile reductions represented an opportunity to capture additional dollars in the defense budget. That the DOD was motivated by its organisational propensity for budgetary expansion is evident in the

tenacity with which it pursued this new mission. Congressional appropriators were at one point 'disturbed to learn that individuals employed by the Department of Defense have visited the Congress with paid consultants to "promote" the chemical agents and munitions destruction program' (US House of Representatives 1999: 281). Together, these organisational conditions fostered a recontextualisation of the DOD's framing of the chemical stockpile, from tools of war to be maintained for future use, to trash to be discarded, to the justification for costly, technologically-complex engineering programmes that would enable the capture of additional budgetary resources.

Alongside these factors, internal to the DOD, that facilitated its successful adoption of new routines, the international security environment within which this organisation acted evolved in a manner favourable to the reductions mission. During World War II, these weapons were perceived by the United States as a critical source of in-kind deterrence, preventing chemical weapon use by adversaries (Moon 1984: 17; Stockholm International Peace Research Institute 1971a: 147-152). Such thinking continued into the early decades of the Cold War.

Yet this belief in the deterrent benefits of chemical weapon stockpiling began to falter in the 1980s, contributing to the US transition from production and stockpiling of these weapons to their systematic destruction. In 1994 the Chairman of the Joint Chiefs of Staff told the Congress that 'Desert Storm proved that retaliation in kind is not necessarily required to deter the use of chemical weapons' (US Senate 1994: 39). Beyond this strategic reassessment, broader normative shifts drove stockpile reductions efforts. By the late 1990s, Price identified a contemporary conception of these arms as a 'weapon of the weak'. Chemical warfare was associated with discourses of 'barbarism', and nonuse with those of 'civilization' (Price 1997: 134-163). By the onset of systematic elimination in the 1990s, chemical weapons no longer occupied a privileged place in the US arsenal, as they had in the first half of the century.

Thus, stockpile reductions were prefaced by what Schelling termed a 'dominant negative preference' wherein 'not having the weapon is preferred irrespective of whether the other side has it' (Schelling 1984: 244). As predicted by the institutionalist account of organisational behavior, this evolution in the framing of the chemical stockpile created an environment particularly conducive to the DOD's adoption of a new stockpile reductions mission, and its acquisition of the necessary funding.

Unlike the technical bases for chemical weapon and weapons plutonium elimination, which were broadly analogous, dramatic differences are apparent in the organisational contexts in which these reductions missions were pursued. Organisational heuristics, path-dependence and evolution of the institutional framings of stockpiled armaments provide explanations for both the DOE's del-

eterious pivot to plutonium burial and the DOD's ability to reconfigure its relevant capabilities at great expense.

Conclusions

This analysis of technical and organisational characteristics of US chemical weapon and weapons plutonium stockpile reductions efforts yields two main findings. First, material and technical factors—process complexity, cost, etc.—did not unambiguously dictate their divergent outcomes. Effective, internationally accepted means of highly irreversible stockpile destruction were available in both cases, at similar costs. Second, organisational factors offer compelling explanations for both the relative success of the chemical weapon reductions effort and the failure of the weapons plutonium reductions effort. The destruction of weapons plutonium was stymied, in large part, by the DOE's path-dependent preference for alternative means of disposal, supported by the resilience of plutonium's dominant framing in US strategic discourses. Conversely, chemical disarmament has been facilitated by unique characteristics of the DOD and its operating environment, allowing for organisational change in accordance with a pervasive societal disinterest in the possession of these weapons.

Organisation theory proves a powerful tool for explaining the central puzzle of this disparity in outcomes. It also draws attention to two critical factors that facilitate successful stockpile reductions: liberation of the managing organisation from path-dependent organisational constraints and institutionalisation of the inherent undesirability of the stockpiled material (e.g., the formation of a dominant negative preference against stockpiling). While it may appear obvious that a state must be normatively committed to the elimination of weapons if it is expected to bear the potentially massive costs of eliminating them, the plutonium stockpile reduction case considered here suggests that the effects of these normative forces (or their absence) extend far beyond cases of complete renunciation of a weapons system. They may also, as in the plutonium case, influence the ability of a state to eliminate even a small fraction of a stockpile that has been declared excess to military needs.

These findings provide several lessons for future stockpile reductions efforts. First, the delegation of responsibility for managing these efforts constitutes a key determinant of their future progress. In the weapons plutonium case, the deleterious effects of staid organisational routines might be avoided by delegation of the reductions mission to a new organisation.[24] Alternatively, as recently proposed by the US Senate Armed Services Committee, the NNSA might be divorced from the DOE, insulating its management of the weapons stockpile from the 'flawed DOE organizational process' (Daly 2018). Second, reductions are un-

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24 This mirrors recommendations for extrication of civilian nuclear waste management responsibilities from the DOE (Reset Steering Committee 2018: 27-41).

likely to find success unless paired with a broader security strategy and a political framing of the stockpile that are supportive of elimination. For example, integration into a broader arms control regime can help to stabilise individual agreements and programmes (Young 1986). Considering again the plutonium case, pursuit of a Fissile Material Cutoff Treaty alongside reductions could yield a more durable mandate for irreversible, multilateral stockpile reductions.

While this study focused on just two instances of US stockpile reductions, its approach and findings might be applied more broadly. As other states confront their aging stockpiles of chemical, nuclear and biological weapon materials, additional cases of relevance will arise. Many will involve the same technical and social challenges discussed here. For example, Russia's chemical weapon destruction programme, declared complete by the Organisation for the Prohibition of Chemical Weapons in 2017, was plagued by 'a lack of funding from domestic and international sources, political and bureaucratic instability, disagreements between federal authorities and regional leaders and public concerns about the environmental consequences of destruction' (Pikayev 2001: 31). These factors mirror those encountered in the US chemical and nuclear stockpile reductions programmes, and will likely arise in future reduction efforts.

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Two Dimensions of Existence of the 'Slum' in the Global City: A Comparative Case Study of Informal Settlements in Nairobi and Mumbai

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Abstract

The cities of the Global South have been predominantly approached as dual cities being embedded within the formal/informal dichotomy. This article provides an analysis of the power dynamics of formal and informal, using an example of public space in two informal settlements: Kibera in Nairobi, Kenya, and Dharavi in Mumbai, India. Based on my middle-term ethnographic research conducted in both settlements, I argue that the former binarism of coloniser and colonised has been transformed into the post-independence binarism of formal and informal. I interpret my ethnographic data by using Frantz Fanon's theory about space and psychology of colonialism. I associate the formal sphere with Fanonian whiteness and the informal sphere with Fanonian blackness. From this perspective, I interpret the development of informal settlements as forcible formalisation. In such a process, by being pushed by the demands of the formality, local patterns of the informality are largely omitted and the elite-designed solutions frequently fail or – even worse – lead to the deterioration of the inhabitants' situation.

The colonial world is a world divided into compartments. . . . Yet, if we will examine closely this system of compartments, we will at least be able to reveal the lines of force it implies. This approach to the colonial world, its ordering and geographical layout allow us to mark out the lines on which a decolonized society will be reorganized.

Frantz Fanon (1963): The Wretched of the Earth, 37-38

Introduction

'In Kibera everyone has a chill-spot. People can spontaneously form a group at the corner on the street and share their troubles. This is the most secure way to survive in poverty. You hardly find this anywhere else', explained Kevo, an artist from Kibera, one of the largest informal settlements in Nairobi. When saying 'anywhere else' he pointed to the high-rises surrounding Kibera. In other words, Kevo was characterising the difference between the public space of formal and informal spheres of the city. While the informal one is shared and regulated by the inhabitants themselves, the formal one, similarly to its Western counterpart, renders such activities as chill-spots impossible.

Similarly to other disciplines of social science, urban studies also recently underwent a shift towards more decentralised knowledge production as a reaction to the postcolonial critique of the universal character of social relations. Over the last two decades a significant amount of scholarship has arisen challenging the universal understanding of urbanism originally produced in European and North American cities (Myers 2014: 105). The decentring production of knowledge on global urbanism thus includes the move from the over-reliance on Western cities that tend to be interpreted as 'ordinary cities'. Despite analysing cities in developing regions in a comparison of its Western counterparts, the current wave of global urbanism applies various ways of analysis while aware of the diversity in which the urban is produced and lived within a globalised world.

This board of scholarship aims to understand the urban across its many formations and it searches for knowledge that is open, diverse and non-singular (Robinson 2021). Therefore many urban theorists seek to challenge the cosmic scale of planetary urbanism by putting an emphasis on the everyday practices of human social reproduction and space-production. Comparative case studies providing the point of view from various angles – frequently bottom-up – thus has become one of the features of today's urban studies (Perera 2016; Roy 2011).

A considerable shift has also taken place in scholarship analysing the informal settlements of Global South cities. The informal settlements have been pre-

dominantly approached within developmental and civilisational discourses replicating the Western-centric understanding of cities and thus depicting informal settlements in the comparison of how the ordinary cities should look. Such an approach led to the labelling of informal settlements as symbols of the Global South's failure as represented in Davis's influential book *The Planet of Slums* (Davis 2006). Many scholars have opposed the term slum as very vague and simplistic based on the oriental and exotic imaginaries of urban degeneration. Indeed, many academics have pointed to the fact that the catastrophic representation of informal settlements and their criminalisation has frequently been used by the elites to control the urban population (Wacquant 1997; Gilbert 2007; Arabindoo 2011).

Such a generalised and stereotyped representation has been challenged by various scholars investigating the city's informality not as a universal phenomenon but rather as being composed of the vast diversity of communities and their livelihoods. Singular and comparative case studies have thus become one of the features of present-day urban studies aiming to decentralise the knowledge production. However, these authors differ on how they define the informality and thus provide a variety of conceptualisations of the formal and informal dichotomies. For instance, Hart argues that the formal/informal dualism has at least three constructions. First, the informal may be the variable content of form, the street vendors selling cigarettes thus invisibly complete the chain between large companies and customers. Second, it might be the negation of formal institutions, whether in the form of squatting, tax evasion or the world drug business. Third, it may be the residue of what is generally understood as representing the formal (Hart 1985). Lefebvre interprets the city as situated halfway between what he calls the near order and the far order. While the near order is created by the relations of individuals in groups of variable size which are more or less organised, the far order represents a society regulated by powerful actors such as institutions (Church and State). The far order persuades through and by the near order, which conforms its compelling power (Lefebvre 1996: 101). Similarly to Lefebvre, Perera distinguishes between two types of space. The first one he calls 'the abstract space' defined by forms, structures and processes that are established by wealthy actors who are powerful enough to both shape and erase the spaces and histories of others. However, as Perera argues, ordinary people do not passively submit themselves to these abstract spaces and they produce their own 'people's spaces' (Perera 2016: 3).

This difference between formal and informal is the focus of the ethnographic research I conducted in two informal settlements – Kibera in Nairobi and Dharavi in Mumbai. I interpret my ethnographic data primarily by using Frantz Fanon's theory about space psychology of colonialism. Fanon's colonial world

was a world cut in two – black and white (Fanon 1963: 28). In this article, I associate the formal sphere with Fanonian whiteness and the informal one with Fanonian blackness. In doing so, I aim to reveal the dynamics of the spatial management of the city's informality and explore its psychological impacts on the inhabitants of both formal and informal neighbourhoods.

Fanon and those who build on his work point to the ways in which the colonial system systematically divided everything that is white from everything that is black. This happens physically and spatially, but also – and perhaps more importantly – it occurs at moral and psychological levels too (Derek 2004). I apply Fanon's understanding of the colonial city as divided into compartments along the black and white to the post-colonial division of the formal and informal. The white, formalised part of the city is associated with 'The Civilisation' which means developed, organised, safe, clean or moral, while the black, informal part is identified in opposition to the formal – underdeveloped, unorganised, dangerous, immoral and full of filth. From this perspective, the management of the city's informality is not only about material and economic uplifting. It is a process which touches all aspects of human life – a process where the informal individual is forcibly formalised. Many activities that sustain the lives of the inhabitants of the informal settlements, such as formation of chill-spots in Kibera, are rendered unwanted and immoral through the eyes of the city's formality. I pay special attention to the difference between the shared public space of informality and the individual public space of the formality. Many development approaches intended to help the poor are inevitably tied to regulations and rules of the formality and thus break the social ties of the informality. In the end, however, the implementation of ideas originally designed to help the inhabitants of informal settlements often leads to worsening their situation.

The article engages with three bodies of literature. First and foremost, this text is a contribution to the scholarship that aims to shed more light on urban space from the perspective of its residents and uses the local knowledge and practices for the analysis of dominant discourses embedded in the 'Global South' paradigm. As During argues, the 'Global South' paradigm has to be replaced by the analysis that will not divide the world geographically and politically, but rather will take into consideration the capitalist precarity as well as local emancipation movements (During 2020). Sheppard et al. call for the provincialisation of global urbanism to identify and empower new ways of enunciation from which to speak back against, and thereby challenge the mainstream global urbanism (Sheppard, Leitner & Maringanti 2013). The authors draw on Chakrabarty's two conceptualisations of histories of capital: 'History 1' and 'History 2'. History 1 presents the history of Western Europe and North America as the global norm against which everything is to be judged. History 2 represents

the histories outside this paradigm having been frequently judged as failing in achieving History 1. However, in Chakrabarty's words, History 2 actually represents powerful alternatives drawing the strength to resist becoming 'forms of [globalizing capitalism's] own life-processes' (Chakrabarty 2000: 63) and provides 'more effective narratives of human belonging' (Chakrabarty 2000: 70). In this article, I interpret socio-spatial processes produced by the residents of Kibera as forming the active resistance to the city's so-called formality and thus representing an example of the so-called History 2.

Second, the study engages with the literature that seeks to understand how the informality in the cities of the so-called 'Global South' is studied and approached by dominant discourses, including the popular ones. There is a significant body of literature that points to the visual representation of informal settlements: For instance, Roy argues that the Global city is worlded (Spivak 1985) through the icon of a slum and refers to the Oscar-winning movie *Slumdog Millionaire (2008)* which she depicts as 'poverty pornography' (Roy 2011: 225). There are scholars who research the connection of criminality and informality, such as Ridda, who investigate the specific relations between exploitation, colonisation and the underworld within the connection of the postcolonial city and the discourse on crime (Ridda 2020). A significant body of literature theorises the developmental discourse, such as Murray Li, who interprets the development as 'the will to improve' situated in Foucault's understanding of governmentality (Li 2007: 5). In the case study of the Nubian and Kenya Slum Upgrading Project in Kibera, Balaton-Chrimes depicts the development as a 'profoundly political space in which subjectivities are shaped through recognition, misrecognition and non-recognition' (Balaton-Chrimes 2017: 4). Another approach adopted by various scholars is concerned with the concept of illegibility. For instance, Wacquant points to the representation of a ghetto as a place of disorder and deficiency and argues that based on direct observation, the ghetto is revealed to be far from disorganised, but rather 'organized according to different principles' (Wacquant 1997: 346). I associate myself with this approach concerning the concept of illegibility, where the viewer's subjective feeling of disorder is directly associated with overall human and moral degradation.

Third, the article investigates the spatial dimension of Frantz Fanon's work while applying his theories to the current situation of postcolonial cities. There is a broad agreement among scholars who accept Fanon's spatial narrative. Bhabha sees Fanon's understanding of violence as being rooted in the very definition of colonial space (Bhabha 1994: 43). Said stresses Fanon's understanding of subject-object distinction primarily from the geographical perspective, not the historical (Said 1999). Varma discusses Fanon as evoking colonial cartography through contrasting the economy of black and light (Varma 2012: 41). She

argues that Fanon's writings shed light on the forbidden zones of the others and reveal that the articulation of western values such as urbanity, civility or order was possible only through dehumanising the natives (Varma 2012: 9). According to Kipfer, Fanon treated the colonial system as a spatial organisation and the everyday racism as primarily spatial relations. He also understood decolonisation as reappropriating and transforming spatial relations in the colonial city (Kipfer 2007: 701). Pile argues that for Fanon, the colonial system not only sets the skin hierarchies through the visibility of the body, but also territorialises the body. The black/white skin colour is not only imposed from the outside, but is also rooted in the movements of people (Pile 2000). In the text, I primarily agree with Bhabha's interpretation of Fanon's colonial space as marked by 'Manichean delirium' as splitting the colonial space of both consciousness and society, in which 'the Negro' is trapped in his inferiority while the white man in his superiority (Bhabha 1994: 43). I am particularly interested in Fanon's understanding of collective unconsciousness (Fanon 2008: 145) and his concept of the 'internalized inferiority' (Fanon 2008: 4) as shaping both the consciousness and the space of Nairobi and Mumbai.

The article will proceed in five steps. First, it interprets the history of both Nairobi and Mumbai through Fanon's understanding of the colonial world as divided into compartments. Second, the text provides an ethnographic analysis of everyday life both in Kibera and Dharavi with a special emphasis on shared public space. Third, the article investigates the spatial dimension of formalising the informality at the city level on two selected examples of redevelopment programmes – Kibera Soweto East and the Dharavi Redevelopment Program. The fourth section provides an analysis of the formalisation processes at the individual level, primarily using Fanon's concepts of collective unconsciousness and internalised inferiority. Finally, I conclude the article with the analysis of the local response of inhabitants from Kibera who aim to secure their public space through its destigmatisation and call for a paradigm shift where slums will no longer be seen on the basis of disorder and deficiency but rather depicted as an alternative to the normative (Western) urbanism.

My methodology can largely be described as an inductive comparative case study. I define several social elements from the respective cases, and analyse its function within the public space in both the informal and formal sphere of the city. These social elements were selected inductively, that is, they resulted from my middle-length ethnographic research in Kibera and Dharavi, where I spent more than five months (in Kibera) and almost one month (in Dharavi). In both settlements, I conducted in-depth interviews, focus groups and participant observation. In Kibera I did more than 70 interviews, gathered about 100 pages of notes and filmed more than 150 hours of material. In Dharavi, I did interviews

with more than 30 people and gathered about 50 pages of notes. Only through this experience was I able to distil two particular social phenomena that proved key for the construction of formality/informality: In Dharavi, I analyse the multidimensional use of space as the key instrument of community life. It allows its inhabitants to use one space for housing, production and distribution at the same time. However, this is unthinkable within the formal sphere of the city in which housing, production and distribution are usually divided into separated sectors. In Kibera, I analyse social units which local inhabitants call 'chill-spots'. A chill-spot basically means when two or more people sit down in a public space and spend time together by talking, exchanging information or sharing ideas. Such behaviour, which is a crucial aspect of social life in Kibera, is also hardly possible in the formal sphere.

Constructing the informality

Spatial data on informal settlements are frequently generalised, outdated and not available. As a result, very limited knowledge exists about informal settlements in terms of their comparison across the so-called Global South. According to the data provided by the World Bank, in 2020 49% of the population was living in informal settlements in India. In Kenya, it was 51% (World Bank 2020). It is generally agreed that the major reason for the global spread of informal settlements is the rapid urbanisation and labour migration. Both India and Kenya experience similar patterns in terms of the urban population's growth. In India, the urban population grew from 31% in 2010 to 35% in 2022, the Kenyan urban population increased from 21% in 2010 to 25% in 2022 (World Bank 2022). There are a few quantitative studies comparing various social and spatial aspects of informal settlements worldwide. For instance, Kuffer's study proves that informal settlements across different African and Asian cities share certain locational characteristics. They are frequently found in places with good accessibility nearby main roads or close to the city centre; however, at the same time they are located on the land that is less attractive for formal development due to the risk of flooding (Kuffer et al. 2018). Indeed, this is the case of both Kibera and Dharavi. Both settlements are located nearby the city centre and at the same time parts of both settlements spread over areas that are officially restricted for any formal construction – both settlements are located nearby a river, Dharavi itself is also threatened by the rising sea level.

Kibera, wrongly characterised by many as 'the biggest slum in Africa', is one of the largest informal settlements in Nairobi. The population of Nairobi exceeds 4.3 million people according to the 2019 Kenya Population and Housing Census (KNBS 2019) and 60% of the city's population lives in informal settlements on only 2.5% of the administrative area of the city (Kuffer et al. 2018). According to

the most accurate estimation from 2009, the size of Kibera's population is about 200,000 people (Desgroppes & Taupin 2011). The growth of the population is mostly attributed to its proximity to the Central Business District and the industrial area. The majority of the inhabitants thus work as casual labourers as well as small scale entrepreneurs (Kiyu 2014: 99). The settlement spreads over an area of 2.38 square kilometres and is located about seven kilometres from the city centre (Desgroppes & Taupin 2011). Ethnically, the population of Kibera is diverse, representing the majority of Kenya's largest ethnic groups. The settlement is broken into 13 villages whose borders are informally defined by natural border makers such as walking paths, streams or railway lines (Ekdale 2011).

In 2022, Mumbai reached a population of almost 21 million people and thus represents the most densely populated city in India (World Population Review 2022). It is estimated that more than 40% of the population lives in informal settlements that spread over 11% of the area of the city (Kuffer et al. 2018). Similarly to Kibera, Dharavi has also frequently been labelled the 'largest slum in Asia'. The area of the settlement is three square kilometres and houses upwards of a million residents (Saglio-Yatzimirski 2013). Given its historical roots when the colonial government indirectly founded Dharavi by segregating polluting industries to the edges of the city, the settlement has maintained its original function and today represents probably the largest centre of informal industry in Mumbai. A significant number of the inhabitants is thus engaged in running small-scale manufactories focusing primarily on leather tanning, garment manufacturing, pottery and the newly added recycling industry (Wienstein 2014: 3-4). According to Sharma, people migrated to Dharavi from various rural regions all around India during different stages of Indian history and thus represent the diverse mixture of Indian ethnic as well as religious groups (Sharma 2000: 3-32). Another specificity of the organisation of Dharavi is related to India's traditional caste system, especially to the so-called untouchable communities which constitute approximately half of the population of Dharavi (Saglio-Yatzimirski 2013).

Both Nairobi and Mumbai were established as centres of the British colonial administration. While Mumbai with its two-thousand-year history developed into the largest commercial and industrial city in India under the British administration by 1900, Nairobi owes its very existence to the colonial regime which founded the city as the administration centre while constructing the Uganda Railway in 1899. In 1907 the city already had a population of 11,000 inhabitants and was officially accepted as the capital city of British East Africa. (Ekdale 2011).

The understanding of Nairobi as an 'oasis of western civilisation' in what the colonisers perceived as an alienated environment created a foundation for the colonial logic of rule and urban planning, most visible through creating racialised urban zones (Varma 2012: 78). Despite the large number of African workers, the

colonial administration intended to keep Nairobi a home for non-African residents. The natives were segregated on the edges of the city in so-called 'native zones' (Ekdale 2011).

This is the urban situation that Fanon characterises as the colonial world divided into compartments – cut in two – and 'inhabited by two different species' (Fanon 1963: 40). He distinguishes between the settlers' town and the town belonging to the colonised people. The first one Fanon characterises as a strongly built town, made of stone and steel: 'The settlers' feet are never visible, except perhaps in the sea; but protected by strong shoes although the streets of his town are clean and even, with no holes or stones. The settlers' town is well-fed town, an easy-going town; its belly is always full of good things. The settlers' town is a town of white people, of foreigners.' Contrarily to the settlers' town, the native town Fanon characterises as 'a place of ill fame, peopled by men of evil repute. They are born there, it matters little where or how; they die there, it matters not where or how . . . The native town is a hungry town, starved of bread, of meat, of shoes, of coal, of light' (Fanon 1963: 39).

In Fanon's analysis, the two parts of the city are spatially and ideologically organised to enable the whole set of various representations which depict the native quarters as backward and thus enable the projection of Eurocentric urbanism and a civilising mission.

For instance, from the beginning of the colonial urbanisation the authorities displayed what Coquéry-Vidrovitch calls a 'sanitation syndrome'. The zoning system was justified as a strategy to separate 'diseased natives' from healthy Europeans. Those 'healthy neighbourhoods' were perceived as the only one 'true city' compared to native areas, frequently called 'villages', although those 'villages' were true urban districts with the majority of the town's population (Coquéry-Vidrovitch 2012). Despite the fact that the Europeans never constituted more than ten percent of Nairobi's population, colonial administration strictly controlled the city through legislation and residential zoning restrictions in order to keep the core of the city white (Varma 2012: 80).

The sanitation syndrome was also common in colonial Mumbai. For instance, the plague of 1896 resulted in the implementation of hygiene and safety criteria in the city planning, such as widening roads or improving house conditions which, however, took place only in neighbourhoods occupied by privileged classes of society. There was almost no investment to develop lower class neighbourhoods. In fact, many poor workers were pushed to live on the edges to ensure the health security of white colonisers (Sharma 2000: 4-10).

Kibera was founded in 1904 when Nubian soldiers who had served in the British East African Army settled nearby newly erected Nairobi. In 1912 they were granted official permission to settle in the area rent-free as an unofficial pension

for their special duties in the army. The area occupied by Nubian soldiers was originally a forest, in the Nubian language 'Kibra', which is how Kibera got its name. Soon after, the Nubians started to rent out the remaining land to the vast number of African workers migrating to the growing city (Ekdale 2011).

Dharavi, originally a fishing village, started to turn into the centre of informal economy hand in hand with the industrialisation of Mumbai and due to the labour migration. At the end of the 19th century the colonial administration decided to segregate polluting industries such as leather and pottery to the peripheries of Bombay. Since then Dharavi turned into the centre of those industries, which continues to today with the newly added recycling industry (Saglio-Yatzimirski 2013: 52-53).

When the colonial government lost control over the movement of people in Nairobi after independence, the city experienced rapid rural-city migration. Despite the city and its way of living being depicted as a typical form of western modernity, its reshaping after independence was perceived as determining the nation's development. As Varma argues, 'Nairobi became the postcolonial project par excellence – it was where the visible, material symbols of colonial rule were to be reinvested with African meanings, and where people of different ethnicities and tribal affiliations would become national citizens' (Varma 2012: 84).

Fanon interpreted the whole colonial system as created and sustained by violence and argued that it could also be destroyed only by violence. Simultaneously he understood the fight for the liberation as the reappropriation and thus transformation of colonial space. As Kipfer argues, Fanon describes the war of movement of national liberation as 'claim to the city' (Kipfer 2007: 713). According to Fanon, if we closely examine the Manichean system of compartments, we will be able to reveal the lines on which the postcolonial society will be reorganised (Fanon 1963: 37-38). However, he strongly emphasised the 'lumpenproletariat' to be the main force behind any revolution and warned against middle class representatives taking over the power in the country for their acceptance of the colonisers' views (Fanon 1963: 130).

It might be argued that the post-independence development of both Nairobi and Mumbai followed Fanon's pessimistic prediction rather than the optimistic one. In Nairobi, the spatial transformation took place in the form of replacing white rule by black rule; however, the civil society remained divided on the basis of tribal and racial differences, keeping older hierarchies and inequalities. Those who had been the beneficiaries of the colonial system defended their privileged positions and kept the colonial form of governance (Varma 2012: 84-85). Mumbai experienced a similar development. The already developed areas remained occupied by middle and upper classes representatives and the number of informal settlements all around the city was significantly growing. There was vacant land

in both cities but no one intended to invest into housing for the poor. Instead, land owned by the municipality or the government was reserved for the future construction of public facilities such as hospitals, parks or schools, and private owners decided to keep their tracks of land vacant in the hope that land prices would escalate and bring larger profits in the future. Over time, these empty plots turned into informal settlements (Sharma 2000: 11).

Fanon's notion about the 'frontier lines' modelled around the former black and white compartments is thus very relevant for the analysis of the present-day postcolonial city. It might be argued that the frontier line is still there but now sets the border between the formal and informal parts of the city. If there used to be the white civilised man on one side and the uncivilised negro on the other side, now it is the middle-class gentlemen who is constantly disturbed and threatened by a dirty slum-dweller with a hunger gaze.

Both Kibera and Dharavi were born at the same time as their surrounding cities, experienced the colonial as well as the post-independence period and have always been embedded within discourses that have constantly imposed various forms of hegemony onto them. For tens of years, both settlements have been approached as sites of all kinds of human tragedies, and thus justified as targets of various forms of control, including forcible resettlement and eradication.

However, over the last two decades there has been a growing body of literature that is critical of stereotyped perceptions of the city's informality. In 2007 Gilbert warned against the reintroduction of the word 'slum' in the UN's initiative 'Cities Without Slums' launched in 1999. He argued that the term slum is not an absolute, but a relative concept, embedded in the discourse of politics rather than of science. It is its negative and universal associations that make the term dangerous and easily misused as part of a justification for various forms of control of population (Gilbert 2007). Following Gilbert's criticism, there is a significant body of literature that theorises the usage of the word slum as well as its visual manifestations and representations. For instance, Jones and Sanyal critically point to the spectacle narratives of slums which function as a worlding device that produces a partial knowledge about global urban poverty (Jones & Sanyal 2015). Roy argues that the Global City is worlded through the icon of the slum (Roy 2011). Jones argues that what primarily matters is how we recognise the slum and which set of representations we use. Defining slums primarily on the basis of deficits 'preserve[s] the idea of the slum as the antithesis of modernity and its inhabitants as "social anomalies"'. At the end, Jones argues that there is a need for new imaginative texts that will provide new vocabulary, explore different angles and provide new voices that can challenge the current dystopian narrative of slums (Jones 2011).

The informal order

In the book *People's Spaces*, Perera focuses on 'the production of lives spaces by those who do not have the power to produce abstract spaces and erase other spaces' and refers to self-established settlements inhabited by the majority of the population in the cities of the Global South (Perera 2016: 3). He argues that to see and understand the ordinary practices of people inhabiting those emerging spaces is a completely different discipline than just collecting new data within already existing intellectual or theoretical paradigms. To be able to see we first have to acknowledge that the local knowledge 'is different and more diverse than the formal' (Perera 2016: 5). Academics are frequently able to see and interpret problems that are legible to them, such as lack of housing, and thus develop a formal solution within mainstream understanding (Perera 2016: 9). However, such approaches might be strongly influenced by the viewer's point of view and thus be revealed as misleading. To minimise the misunderstanding, Perera encourages us to adopt our intellectual framework to local conditions and engage in our observation the producer and users' perspective (Perera 2016: 7).

When I was entering Kibera for the first time, I had no clue that one day I would be aspiring to a PhD with a dissertation on the postcolonial identities of slums and that Kibera would become a focal point of my interest for many years. I first encountered Kibera as a filmmaker in 2016 when I was asked by a development worker to make a film about the strength of people living in slums in Nairobi. Even though the initial thought of a film might seem extremely romantic and could easily become a target of postcolonial critique, it opened the field for me as well as giving me a very firm position and viewpoint to look at Kibera primarily from the perspective of its residents. What I also consider as important for my ethnographic experience is the fact that during my first encounter with Kibera I did not have any theoretical background in mind, nor any specific plan of my research that directed my attention. I was simply trying to unfold the everyday reality of life in Kibera with a special attention on how the inhabitants aim to overcome the systemic limitation connected with living in a slum.

My first research activity in Kibera could be depicted by Gusterson's world as 'deep hanging out' (Gusterson 2008: 93); indeed, at that time I did not know that I was already conducting a very important part of my fieldwork. Most of the time I was primarily sitting and talking with other residents of Kibera. Sometimes I was amazed by the time and space flexibility people from Kibera had. When I walked on the street I was frequently involved (sometimes voluntarily, sometimes not) in a group conversation of people sitting on a street corner. With time, I have realised that this is a key element of social life in Kibera, something that is inevitable – that people in Kibera meet, sit and talk

anytime and anywhere. The longer I was in Kibera, the more I was able to see small informal pubs hidden between barracks, tables randomly set on the street used by people to play games, or informal cinemas with old TVs and DVD players. However, I still considered this as something just normal attached to this informal world and as something not worth further attention.

Gusterson argues that 'sometimes what opens the village doors can be quite unpredictable, especially to an outsider' (Gusterson 2008: 96). To me it was the art exhibition of Maasai Mbili, a collective of artists from Kibera. Kevo Stero, one of its core members, introduced his happening called the 'Jobless Corner Campus (JCC)' at the exhibition's opening. Kevo introduced the JCC as a fake NGO whose aim is to destigmatise people spending their time in chill-spots in Kibera who are frequently accused of being pure idlers. According to Kevo, everyone in Kibera has his or her own chill-spot. A chill-spot can be anything – stairs, a bench or a couple of chairs around someone's shop. Some chill-spots last one afternoon, some remain in the same place for several years visited by the same people every day. As Kevo argues, 'to have a chill-spot is the most secure way for survival in Kibera. If I am doing badly, I can go to my chill-spot to meet other people who will support me. The same is expected from me tomorrow.' However, from the dominant discourse perspective, people spending time in chill-spots are generally stigmatised as pure idlers, or even worse, as groups of alcoholics waiting along the street to rob someone.

To destigmatise chill-spots, the JCC automatically offers all people in Kibera's chill-spots the title of 'professional idler'. At the exhibition's opening, Kevo officially introduced the JCC by following words:

> [the] JCC is a non-profit local organisation whose concern is to fight for the rights of idleness and idlers in Kibera. . . . Basically Idling and just talking is a social development approach that facilitates a community driven development processes with a view to enabling people to talk-atively and participate in sharping their spiritual destiny. Idling enables communities to come together within their own developed personal structures in order to address issues and problems they face.

Kevo's idea is not pure irony. By founding a fake NGO he actually creates a locally based conceptualisation of the Western institution that projects its values on life in informal settlements. In his opening speech for the exhibition he claimed that the JCC is an international organisation welcoming all idlers from all around the world. He argued that chill-spots exist everywhere, including the parliament or in academia: 'Socialization is a basic human need and its denial could be depicted as an abuse of human rights.' In fact, Kevo pointed to the

preface of formality where everything is nested within a paradigm of economic growth and one's ability to work.

After the exhibition, I saw Kibera in a different light. I realised that what I used to see as random and chaotic groupings within the slum was actually a very well organised network of informal activities in which the chill-spots function as its core units. Perera argues, that 'even to see local practices for what they are, we need a language, i.e., an instrument of mediation, between the consciousness and the world that consciousness inhabits' (Perera 2016: 7). Kevo's conceptualisation of idleness in informal settlements provided me this instrument of mediation to interpret the everyday life in the city's informality as well as to distinguish the two abovementioned types of consciousness – the outside, formal one and the local, informal one.

Within the period of a year, my former film location slowly turned into the field of my academic research. During my second and third visit to Kibera I already had the idea for my PhD research which I decided to dedicate to the special function of public space in informal settlements.

For many, the day in Kibera starts with the search for a part-time job. There is a common phrase 'to sit on the stone' which refers to waiting on the street for someone who will come with a job offer. Chill-spots formed along the street thus function as 'waiting rooms' where one can talk and share ideas with other people while waiting. My respondents especially favoured the fact that one can enter the chill-spot with no money in their pocket and use it as an important starting point.

With time I have realised that this informal grouping is an integral part of everyday life in Kibera and that chill-spots just manifest a much larger network that touches all aspects of life including all generations of the inhabitants – from children to the elderly. The network functions on the basis of informal leadership – once someone gets experience, he or she passes it on to the others. My respondents frequently pointed to some members of the community by saying that 'this is our respected leader'. In such a way, the inhabitants of Kibera supplement many services which are granted in the formality and are frequently missing in the informality. It is the way people supplement education, the bank system (through microfinance groups) or insurance (through the mutual assistance between neighbours).

During my first visit to Kibera I met Omosh, owner of a small shop at the edge of Kibera. Five years ago, trained as a chef's assistant, he moved to Nairobi with a desire to find a job in an official restaurant in the city. However, after several weeks of trying, Omosh was not able to find a job and due to the high rents in the city had to move to Kibera. Initially, he interpreted his move to Kibera as a big failure. He said that at the beginning he hated the place and did not want to

have anything in common with the people around him. He rented a house and was running his shop at the edge of Kibera because he was afraid to go deeper into the slum. He was constantly struggling to sustain himself because he did not have enough customers. One day he found that his shop was robbed. That day, Omosh says, he hit rock bottom. After that moment he realised that in order to do well he should reset his mindset towards Kibera and accept the environment as it is.

The second time I met Omosh was a year later. He was still running his shop and argued that he was doing much better. Since accepting Kibera he had gotten in touch with his neighbours who became his customers. In the evening, Omosh usually set up a speaker in front of his shop and played music for passersby. Almost every afternoon I walked around his shop I saw a group of young people surrounding Omosh's shop, enjoying music and drinking soda. In other words, Omosh created his own chill-spot. From time to time, he collected money from his friends and cooked a big meal for them. Soon after, word of Omosh's cooking skills spread across Kibera and since then Omosh gets an offer monthly to do catering for various events such as birthday parties.

Omosh's story depicts the sustainable function that chill-spots in Kibera have. However, while talking about Kibera to the middle and upper class representatives, for instance, during my flights to Kenya, the vast majority depicted Kibera as a no-go zone. Even the residents from Ayani or Jahmuri neighbourhoods just next to Kibera prefer shopping in a distant supermarket rather than entering the market in Kibera located nearby their houses. When they explained the reasons for their fear, the majority talked about those groups of idlers sitting along the street, watching everyone entering the slum and thinking about how to rob someone. In other words – they provided a description of what chill-spots mean to the middle and upper class representatives: the dark spots on the beauty of the city.

Jordan traces the current meaning of idleness back to the eighteenth century and argues that within the increasingly economic and work-oriented society idleness has been defined in opposition to industriousness. If industriousness is understood not only as central to wealth and power but as a glue that holds the whole society together, then idleness must be understood as a threat to the whole social order (Jordan 2003: 14). In such an environment, one of the tools the middle class adopted to establish its dominant position was associating the labour-class with idleness (Jordan 2003: 19). Further on, Jordan also argues that the discourse of idleness has been important to the British imperial project and its command over non-white people. Associating the white world with industriousness and the darker world with idleness helped the imperial project to order and control (Jordan 2003: 21).

Based on my research and direct observation, the association of slum inhabitants and idleness has much to do with the hegemonic relations within the city, rather than with the reality. Concerning chill-spots in Kibera, there is a different understanding depending on the viewer's position. Drawing on Perere, within a context of 'people's spaces' chill-spots have a vital role essential for the everyday life of the inhabitants, within a context of 'abstract spaces' chill-spots are the first targets either to be erased or formalised in order to achieve a properly functioning capitalised urban space.

During my research I kept thinking about whether such kinds of processes exist elsewhere in other cities of the Global South. In 2018 I decided to conduct a month-long research in Dharavi.

In Dharavi, I found similar responses to those I gathered in Kibera. People favoured the way they cooperate in order to launch various businesses in the informal economic sector. The inhabitants referred to Dharavi as a place crucial for the existence of Mumbai as a whole by accommodating a vast amount of labour necessary for the city's infrastructure, feeding the city's population by food production or cleaning its streets via the recycling industry. However, they were frequently dissatisfied with the negative public perception which characterises the environment as well as the residents as chaotic, disorganised and dirty.

There are a large number of scholars who emphasise Dharavi's informal economy as a unique system that functions on the basis of the multi-dimensional use of space (Sharma 2000; Saglio-Yatzimirski 2013). One house in Dharavi typically has the triple function as a home, manufactory and shop. However, such a system might seem to be complete chaos for the outsider. Perera argues that it is the illegibility from the viewer's perspective that has been projected back onto the settlement in various forms of negative associations that connect Dharavi with danger and filth and thus marginalise its potential (Perera 2016: 142).

Formalising the informality

According to urban architect Christopher Alexander, an ideal type of city is characterised by its wholeness. Since we are those who inhabit the space of the city, everything that happens here will happen to us. If the process fails to produce the wholeness, we suffer (Alexander 1987). Habraken understands the geometry of the city as having always been the hallmark of architectural skill. He refers to the continuous geometry of fields that varies from place to place but at the same time allows us to create formal arrangements of a different nature (Habraken 1987). When we apply both authors' perspectives to the postcolonial city a question arises – what kind of role does the city's informality play in its wholeness? Is it the disruptor of the geometry? Or is it the formality which disrupts the wholeness of the informality?

From this perspective, an analysis of the spatial dimensions of the formality and the informality of the postcolonial city is a fascinating task. In my view, each sphere of the city produces its own kind of wholeness and those two types of wholeness constantly overlap. In Alexander's statement 'if the process fails to produce the wholeness, we suffer' (Alexander 1987: 19); a question arises as to whom he refers with the word 'we'. In fact, in his view there is only one society inhabiting the city. However, we can hardly apply this theory to the postcolonial city strictly separating 'us' from the 'others'. The dynamics of the postcolonial city thus radically challenge the Western paradigm of urbanism.

The environments of both Kibera and Dharavi produce a wholeness based on constant human creativity and interaction. It is an environment based on human cooperation where the movement in the informal public space is not only about passing by and walking through regulated entries, but it is an experience that involves all the senses. As Edensor argues, it seems that the individual walking on the Indian street is constantly challenged by various activities, sensations and sights which render a state at variance to the restrained and distanced distraction of the Western street (Ederson 1998). However, as Chakrabarty points out, the hustle of the Indian street seems to be tainted by orientalism. For instance, he mentions various authors referring to Indians defecating anywhere or spitting on people from the balcony. According to Chakrabarty, the depiction of the Indian street as full of dirt is part of the language of modernity (frequently associated with the Western), its civic consciousness and depiction of public health, or even an order of aesthetics through which the city could be regulated. Such language has been adopted by the imperial rulers and it is also the language of modern governments (Chakrabarty 1991).

Zappula et al. depict formalised parts of the city as symbols of cultural manifestation. Cities are thus the manifestation of symbolic worldviews and theories while the symbol of the formal city is usually associated with regular geometry which is mostly missing in the city's informal parts (Zappula, Suau & Fikfak 2014). Edensor analyses the Western street as having been transformed by the imperatives of modernist planning and consumer capitalism into functional spaces maximising consumption and facilitating transit (Ederson 1998: 202). The formalised urban space thus manifests the imaginary life in a city based on Western individualism. Places for housing, distribution or production are segregated into separated sectors. The public space is tied to many regulations whose main objective is to provide an effective trajectory between the sectors. Shops are placed indoors in spaces designed for shops or are set in the public space at official spots. Places for socialisation are localised officially in restaurants, coffee places, bars or parks. When we encounter the informality from this perspective, everything here seems opposite to the demands of the formality.

According to Fanon every colonised nation – a nation in which an inferiority complex was created through the death of its own cultural originality – redefines itself in relation to the language of the coloniser. The more one adopts the language of the coloniser the whiter it will be (Fanon 2008: 18). If Fanon's Manichean world has persisted until the present, now within the dynamics of formality and informality, then the geometry of the formality manifests the foundations of the desired culture of The Civilisation. Its spatial organisation forms the 'grammar' of that language of life characterised by the Western-centric and work-oriented way of life. The formalisation of informality could be understood as a whitening process – a process where the individual is both forced and desires to become formalised. In the following part of this section I provide a brief analysis of two redevelopment projects, one in Kibera and the second in Dharavi, which could be depicted as highly significant examples of forcible formalisation.

According to Boano et al., the narrative of Dharavi serves to drive the pressures of government and market to turn Mumbai into a world-class city as expressed through the neoliberal Vision Mumbai (Boano, Lamarca & Hunter 2011). One of Vision Mumbai's aspirations was to reduce the number of people living in slums from the current 50-60 percent to 10-20 percent by increasing housing affordability (Vision Mumbai 2003).

The most discussed development project in Dharavi is the so-called Dharavi Redevelopment Project (DRP). Given the strategic location of Dharavi and the government and private sector's goal to achieve the status of world-class city, the DRP was introduced as integrated special planning in 2004. The project was conceived as state facilitated public-private partnership, formulated by the Maharashtra Housing and Area Development Authority (MHADA) and designed by architect Mukesh Mehta. Mehta's aim was to divide the area of Dharavi into five sectors to be allocated to five private developers. The density of population was supposed to be resolved by the maximum increase of high-rise buildings (Boano, Lamarca & Hunter 2011: 299).

The project has been under negotiation since 2004 and, except for the tender process, has never been officially launched because of the heavy criticism by external experts as well as Dhavavi residents themselves (Patel & Arputham 2008). The DRP is mainly criticised for being dismissive of the diverse needs and vibrant economy of the people for whom the project has been conceived (Boano, Lamarca & Hunter 2011: 300).

According to the plan, one of the key strategies to deal with the density of population was the increase in Floor Space Index (FSI); however, without clarity to which extent. As Patel and Arputham state, the higher the FSI, the more likely the residents will be rehoused in high-rise blocks which also means the lesser

provision per person for public amenities, including open spaces, footpaths, schools and hospitals (Patel & Arputham 2008: 247).

Despite the fact that the inhabitants appreciate the improvements to their environment, most of the residents are sceptical concerning the plan's ability to improve their lives. Mostly they fear losing their livelihoods because of the plan to divide the slum into five sectors which is completely opposite to the current multidimensional use of space in Dharavi where one house is simultaneously used as a home, manufactory and shop (Perera 2016: 146-147). Perera criticises Mehta for his belief in the environmental determinism and his trust that 'transforming the built environment can cause social change'. He critically points to the elaboration of Mehta's assistant that living in high-rises will lift the slum-dwellers up to the middle class. In other words, the DRP fails to understand Dharavi from the perspective of its residents but rather depicts the environment from the perspective of its potential. Mehta thus developed an abstract space for Dharavi (Perera 2016: 145).

The Kibera Soweto East Project was launched in the same year as the DRP under the Kenyan Slum Upgrading Programme (KENSUP) – a partnership between the Kenyan government and UN-HABITAT (Fernandez & Calas 2011). The goal of the project was to relocate thousands of Kibera residents and thus rehabilitate the area, where the project sponsors would provide new permanent housing, equipped with better services.

In 2009, five years after the official launch of the project, the residents perceived the project as a top-down approach without enabling the community to participate in the project's planning. According to the UN-HABITAT research a few days before the relocation, 31% of interviewed families were fearful that they would not benefit from the project due to corruption, 27% feared not being able to pay for the new house, 19% feared the lengthy and obscure process and 17% expressed their desire to build their own house rather than be relocated (Fernandez & Calas 2011).

According to Farnander and Calas's assessment in 2011, instead of a bottom-up approach as was initially claimed by KENSUP, the programme turned into the typical forcible relocation. An apartment rental in 2011 was about 3000 KShs which means almost six times higher than the rent the residents had paid in Kibera. The Slum Upgrading Department admitted that it was more the middle class representatives and university students who were currently investing in newly built apartments. Given the lack of space for informal economies, all areas intended for recreation such as gardens were taken up by informal activities, even little spaces between the buildings or verandas of apartments turned into kiosks. However, due to the lack of space and high rent prices, many people ended up jobless due to losing the original customers they had in the slum (Fernandez & Calas 2011).

In the evaluation done by Agayi and Sergaroglu Sag in 2020 the KENSUP project implementation was successful in terms of turning the plan into the physical reality of constructing new houses. However, strong cultural and social bounds among neighbours and relatives were cut off by the relocation. Their informal activities were hit badly by moving them from their established areas of business. The study also establishes that more than half of the families to whom these houses were allocated had either sold, rented or deserted them. In the end, the overall result of the evaluation is that the redevelopment project worsened the lives of the residents (Agayi & Serdaroglu Sag 2020).

As Zappula et al. argue, 'Top-down projects are based on the planning capacity of envisioning the future or forecasting scenarios in which the community will live' (Zappula, Suau & Fikfak 2014: 261). Given the spatial organisation of both the DRP and Soweto East Kibera we can read them as scenarios predicting the future of residents of Dharavi and Kibera. High-rise buildings and no public space designed for the informal activities of the residents immediately predict a future of the formalised life where one has employment and travels to work which is located in a place separate from one's home. However, given the lack of job opportunities such a vision is revealed to be a utopia, at least for the majority of the resettled residents. If the formal city puts limitations on the life of an individual residing in a slum, then the resettlement means a double-limitation: One is cut-off from his informal life but the formal one is unreachable.

The scheme of the redevelopment programme denies the existence of chill-spots in Kibera. As people have proved by turning almost all empty plots into informal kiosks, there is a desire to generate a 'people's space' within a context of the formal, 'abstract space'. However, given the formalised status of the newly erected high-rise buildings, the inhabitants enjoy much less freedom. If they do something that opposes the scenario of the redevelopment programme, it immediately becomes a disruptor of the order of things, something that is in conflict with the law. If a chill-spot was a norm in Kibera, it is a disruptor within the context of a formalised neighbourhood. As a result, given the spatial dimension, people from informality feel less secure once being moved to the formality because they lose much of their social capital as well as opportunities to sustain themselves.

Drawing on Perera, both the DRP and Kibera Soweto East might be depicted as projecting a narrative of an abstract space both onto the people's spaces of Dharavi and Kibera. Li interprets the development as the 'will to improve' that she situates in the field of power, the Foucault-termed government understood as an attempt to shape human behaviour by calculated means. Its main concern is the well-being of population, and the improvement of such conditions as health, wealth or longevity. The government thus operates through the desires, habits, aspirations and beliefs of the population (Li 2007: 5).

Both the DRP and Kibera Soweto East First are functioning on the basis of two distinct processes. First, it is the interpretation of the informal settlement on the basis of negative perceptions and their illegibility that gives a foundation to how both projects are planned. Both of them approach the environment within the mainstream understanding and their main objective is not to provide a sustainable solution to the inhabitants, but to 'solve the problems of slums' – make those terrains formal and legible. As a result, they fail to satisfy the organic needs of the inhabitants. In fact, by focusing only on the legible aspects of both settlements such as housing, infrastructure or sanitation, both projects are unable to see that there are also other important ongoing activities that must be kept in order to achieve a sustainable future for the residents. Second, both programmes operate through the desires of the inhabitants – not only to generally do better in their lives, but primarily through their desires to become part of the 'better world' and wash the stigma of slum away from them.

Two dimensions of existence

Frantz Fanon in his book *Black Skin, White Masks* (1952) argues that 'the black man has two dimensions. One with his fellows, the other with the white man. A Negro behaves differently with a white man and with another Negro' (Fanon 2008: 17). Given the current division of the postcolonial city, we might argue that a resident from an informal settlement also has two dimensions. One while being in the informality, the second one while encountering the formality.

Based on my research, many respondents referred to their double feeling towards Kibera. On one hand they emphasised the organic social life in Kibera and argued that one can hardly find its core values outside the settlement. They stressed such activities as a vibrant social life, the mutual assistance between neighbours and the overall togetherness as core aspects of communal life in Kibera. Some residents associated Kibera with The Motherland. Such answers were given to me primarily by the representatives of the younger generation. However, even the same respondents referred to Kibera simultaneously in an opposite way, describing the environment and its people as a site of human degradation. For instance, they pointed to 'flying toilets' and depicted inhabitants of Kibera as able to defecate anywhere in a plastic bag and throw it in the river or on the street. Among the young generation, there was also an obvious tendency to associate Kibera with a high crime rate while enjoying the ethos of being 'gangsters in the ghetto'. When talking about politics, Kibera and its inhabitants were frequently linked to 'being very good at throwing stones to the police'. Respondents representing the older generation were linking Kibera to even more negative characteristics. They noted that other inhabitants are uneducated and violent. While talking about the future of the settlement, they were very pes-

simistic about the inhabitants' ability to develop themselves. They argued that the main problem behind the failure of development in Kibera is primarily the low civilisational status of its inhabitants and the uplifting of the environment will take place only if people change. In other words, the residents frequently accepted the dominant narrative of slums and its emphasis on the environmental social determinism. They voluntarily accepted the forcible formalisation of an individual as a core aspect of the development.

The important thought underlying *Black Skin, White Masks* is the internalisation of the black man's inferiority through the acceptance of European culture which associates the colonised nation with impurity. As a defence against such a burden, the colonised man wants to escape his own blackness through imitating the European civilisation on all levels of life (McCulloch 1983: 65-66). Fanon draws on Jung's term collective unconsciousness and argues that European civilisation is characterised by the presence of an archetype, existing in the heart of Jung's collective unconscious, which Fanon describes as 'an expression of bad instincts, the darkness inherent in every ego, of the uncivilized savage, the Negro who slumbers on every white man' (Fanon 2008: 187). However, Fanon is critical of Jung's universal assumption that such an archetype is common to all societies by arguing that 'He wanted go back to the childhood of the world, but he made a remarkable mistake: He went back only to the childhood of Europe' (Fanon 1952: 146). Further on, Fanon argues that the collective unconscious is independent from cerebral heredity and is rather a result of the unreflected imposition of culture (Fanon 2008: 191). As a result, through the unreflected imposition of culture the black man has taken over all the archetypes belonging to the European through adopting its collective unconscious. The black remains black but with white collective unconscious. If the European mind associated the Negro with evil, so does the black man as a result of colonisation.

If we apply Fanon's theory to the current narrative of the city's informality, we can observe similar ongoing processes. If there is an archetype of the Negro who slumbers every man in the European collective unconscious, then there is an archetype of an uncontrolled slum-dweller in the collective unconscious of the formal city: This is the slum. The urban jungle – the no-go zone. It is a place of darkness in the minds of those who successfully achieved whiteness. It is a place where one can easily get robbed and raped. The informality, represented through the icon of the slum, symbolises the failure of the national post-independence development – it is a black mirror of The Civilisation.

Based on my ethnographic experience, the inhabitants of an informal settlement socialise on two levels – first, within the informal community, second, within the city and global level. As presented in this paper, those two dimensions constantly overlap. It is inevitable that an individual will get in touch with

the dominant and primarily negative narrative about informality and will end up internalising negative stereotypes that have been imposed on him. In Pile's analysis of Fanon:

> The colonial situation puts a mirror up to the face of the black man and the reflection tells that he is inferior and other. Because colonised peoples recognise themselves as other (to themselves) and because white people are apparently superior and ideal, they are compelled to enact a script which is not their own, to behave according to values and norms which are not theirs; to perform according to standards as if they were their own. . . . By identifying with – and desiring – the position and power of the white man, the black man ends up by seeing himself as 'non-white', non-Master and 'nowhere'. In this way, black man is both alienated from himself and absolutely depersonalised (Pile 2000: 263-264).

The identification of the black man with the position and power of the white man is similar to the identification of an inhabitant of informality with the power and status of formality. During my research I have found many respondents who were living in a constant comparison with the 'better world' outside the slum and thus rendered themselves as the unwanted others.

Fanon stresses the importance of the European family (or family in a pre-industrial society) as the core unit that prepares an individual for life in society (McCulloch 1983: 67). In Europe, the family meets the standards of the fashion in which the world presents itself to the child. The normal child raised by normal parents will become a normal person. This is where Fanon sees the close connection between the structure of the family and the nation compared to Africa where the connection has been lost due to colonialism. The normal black child raised by normal black parents immediately loses its normality in the contact with the white world (Fanon 2008: 141-142).

Using Fanons words, to be raised in the city's formality means to be raised towards the world which is presented as normal and to be raised in the informality means to lose the normality once one meets the formality. The inhabitant of an informal settlement is constantly labelled and approached as the 'slum dweller' whose life is thus determined by a constant comparison with the inhabitant of the formal sphere. It is a process which Fanon describes as 'whenever he comes into contact with someone else, the question of value, of merit, arises' (Fanon 2008/1952: 211). Given the spatial dimension, to come into contact with someone else means crossing the border of the slum and entering the formal city – the only real one which, however, renders the slum inhabitant as its stranger.

When talking about the physical experience while walking through formalised neighbourhoods, respondents from both Kibera and Dharavi provided me with similar answers. First of all, they leave the territory of slums and enter 'the city' only if they have to. When one crosses the border of the slum is it because of some necessary needs such as going to the market, visiting the hospital, communication with authorities or traveling to the countryside. Most respondents characterised their feelings while walking through the formal city as full of self-doubt, over-thinking ('how other people look at me'), the feeling of doing 'something wrong' or fear of being arrested.

Despite the fact that the domination of the white man formally ended both in Kenya and India more than half a century ago, its whiteness has persisted in all the structures of the society, most permanently in the cities – in its geometry, officiality and legality. If there used to be the white town and black native zone, then today there is the real city and the slum. While people from Kibera talk about wealthy neighbourhoods as a 'mzungu place' (Mzungu in Swahili refers to a European), people from Dharavi talk about people from the city's better-off areas as 'gated communities' (given the most common formal housing unit which means several high-rises surrounded by a wall with a gate). The slum-dweller is fixed in the city as Fanon's Negro is in the white world:

> I move slowly in the world, accustomed now to seek no longer for upheaval. I progress by crawling. And already I am being dissected under white eyes, the only real eyes. I am fixed. Having adjusted their microtomes, they objectively cut away slices of my reality. I am laid bare. I feel, I see in those white faces that it is not a new man who has come in, but a new kind of many, a new genus. Why, it's a Negro! (Fanon 2008: 116).

Conclusion: The right to idle

Despite the fact that Kibera and Dharavi are completely different environments they share one important aspect – the way they are perceived and marginalised by the dominant discourses both in Mumbai and Nairobi. In both case studies we can observe how the colonial construction of reality based on the hegemony of coloniser above the colonised has shaped the colonial as well as postcolonial urbanism.

The post-independence social order is functioning on similar principles now within the dichotomy of formal and informal spheres of the city. The paradigm of white colonial cities based on western principles of individualism and economic growth has prevailed until this presence. In such a paradigm when something differs from norms of the white city it is perceived as failing to achieve the formal city's demands.

By 2050 it is projected that more than half of the world's population will live in cities. So the population of those residing in informal settlements will also increase. This makes the city's informality a very significant feature of the future of cities around the world and thus cannot be defined only in comparison to the city's formality but rather depicted as a new urban paradigm.

In such a paradigm, it will be necessary to search for new vocabulary and concepts that will enable us to further analyse and understand the ongoing processes of informality. In such a process, we cannot limit ourselves to just direct observation based on already existing theories. We have to put the most emphasis on the local production of knowledge by the inhabitants of informality themselves and search for their own theorisation and conceptualisation.

Those locally based concepts and theories might contribute in four ways. First, it enables us to read the informality from the perspective of its inhabitants and thus reveal aspects that might be invisible to us. Second, they provide critical feedback on the mainstream understanding of the informality. Third, it provides a direct connection to its practical implementation. Fourth, such an approach facilitates the liberation and healing processes from the abovementioned oppression.

Kevo Stero's conceptualisation of idleness and chill-spots in Kibera provides us with an example. First, it points the importance of the shared public space that facilitates the mutual assistance between the inhabitants. Second, it provides a critical assessment of the normative urbanism and its understanding of public space whose implementation on the informality breaks social ties within the community. Third, the approach practically encourages the maintenance of the shared public space as an important aspect of sustainable development. Fourth, destigmatising chill-spots might facilitate the emancipation of informality and thus lead to the liberation from the formal oppression.

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Borders in Central Europe After the Schengen Agreement

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The waves of the migration crisis struck Europe around 2015 and opened many questions about the Schengen area, its control and its very functioning. *Borders in Central Europe After the Schengen Agreement* states in its introduction that one of its goals is to connect with this period when the Schengen rules gained great importance. Control at the external borders of Schengen did not work as expected, and countries like Greece and Italy were faced with a huge influx of refugees. The entire Schengen system was very strongly criticised by some parties. Therefore the publication also addresses the question of whether the Schengen is a functioning system that really yields benefits or if it's just wishful thinking on the part of some European politicians.

The publication has three main editors: Assistant Professor Tomáš Havlíček from the Faculty of Science at Charles University, Associate Professor Milan Jeřábek from the Department of Geography at Masaryk University, and Associate Professor Jaroslav Dokoupil from the Faculty of Economics at the University of West Bohemia. Additionally, many other researchers contributed to all parts of the book.

Representing Czech academia, the following authors contributed. Petr Dostál, professor of regional and political geography at the Department of Social

Geography and Regional Development at Charles University. Slovak Marian Halás, associate professor at the Faculty of Political Science at Palacký University Olomouc, wrote a chapter on the Slovak borderlands. Josef Miškovský, consultant in the field of local and regional development and member of the Czech Geographic Society, wrote the ninth chapter about the eastern borderland of the Baltic States. The eleventh chapter is the work of three authors: Associate Professor Alena Matušková, Assistant Professor Jiří Preis and Assistant Professor Magdalena Rousová, all of whom are with the Department of Geography at the University of West Bohemia in Plzeň. František Zich is professor of General Sociology and the Sociology of Communication at the University of Finance and Administration, Prague.

Contributing to the chapter on Silesian Identity is Tadeusz Siwek, professor in the Department of Social Geography and Regional Development at the University of Ostrava. Contributing to the twelfth chapter is Veronika Klečková, PhD student in Regional and Political Geography at Charles University.

Leading some chapters are academics from foreign departments, such as Martín Guillermo Ramírez, general secretary at the Association of European Border Regions (AEBR) in Berlin and who wrote chapter six, which deals with the role of the AEBR. The seventh chapter, which is on Switzerland, was written by Walter Leimgruber, professor emeritus at the Institute of Geography at the University of Freiburg, Switzerland.

As for the theoretical framework, it is mainly based on the study of borderlands, which has gained increasing interest in recent years. The publication defines terms such as *borders* and *border areas* very consistently. The main goal of this project was the enrichment and deepening of the theoretical framework for the purposes of studying borderlands, which was to be achieved by analysing the entry of the Czech Republic into the European Union and joining the Schengen area, and the subsequent evaluation of the impacts of this decision, both on the objective and subjective levels. At the theoretical level, the main goals are to identify the administrative aspects of the regions and to capture the internal structure of border regions. While at the application level, the research aims to characterise the effects of cross-border cooperation and specify similarities and differences in the development of the Czech border region at the regional, Euroregional and microregional levels.

A very interesting method in this research is data collection based on the participation of respondents in collaborations with students. The survey was carried out in 2010 between the months of May and October with the help of the students, who collected information directly in the field. A total of 3,283 respondents were obtained. This was 721 respondents from the Euroregion Elbe/Labe (CZ/Germany—Saxony), 860 from Šumava/Bayerischer Wald–Unterer

Inn/Mühlviertel (CZ/Germany—Bavaria), 638 from Silva Nortica (CZ/Austria), 524 from Bílé/Biele Karpaty (CZ/Slovakia) and 540 from the Euroregion Praděd/Pradziad (CZ/Poland).

Some chapters largely provide us with the historical context of how the structure of the Schengen Agreement developed between European countries, which was also complemented by public opinion data and statistics on free cross-border movement and external border controls. Several conclusions are then offered, the main one of which is that nine countries have a rather negative perception of free movement, which is related to the already-mentioned free migration in Europe.

In chapter eleven, attention is especially paid to the Czech territory and how after 2004 the standard of living changed for the 3,300 respondents and whether they consider this change to be beneficial. The interesting results are, for example, that in the Czech-Polish region, more than 50% on the Polish side feel a change for the better. On the other hand, in the largest part (i.e. the German Euroregion Elbe/Labe), 83% of the respondents did not feel any change. In general, however, it can be concluded from the research that the proportion of respondents who consider it a change for the better is greater than those who perceive the changes negatively.

In their conclusions, each chapter in this publication tries to answer one of the questions stated in its introduction and whether the Schengen area is a real phenomenon affecting the lives of citizens living in border areas. Some chapters answer this question very clearly – according to the authors, entry into Schengen has a psychological effect in terms of the free movement of people, rather than an economic benefit connected primarily with the standard of living. These specific conclusions are immediately followed by chapters seven to twelve, which discuss a more specific concept of cooperation between border countries. The successful development of cross-border cooperation then depends on external and internal framework conditions. According to the survey, residents of the area are mostly well informed about these collaborations, but only half of them know the term Euroregion and what it entails. In general, the interviewees consider the possibility of new contacts and opportunities for socioeconomic development to be very beneficial.

The publication is very well and clearly prepared and certainly beneficial not only for the academic community, but also for beginner students of European studies or related fields, as well as for the public. As the greatest contribution, I would highlight one of the methods. Namely, this was the obtainment of knowledge directly from citizens living in these areas, which is sometimes problematic on a larger scale. Here, however, it showed us how Schengen is really perceived by these residents (either positively or negatively) and how this study can help

further discussions regarding the functioning of the Schengen area in the future. As a result, the publication fulfilled one of its main goals and enriched the study of borderlands not only by deepening the theoretical framework, but also methodologically. The importance of personal opinions of specific individuals living in the researched areas has proven to be very beneficial and rewarding for these types of research works in the future.