The Hague Centre
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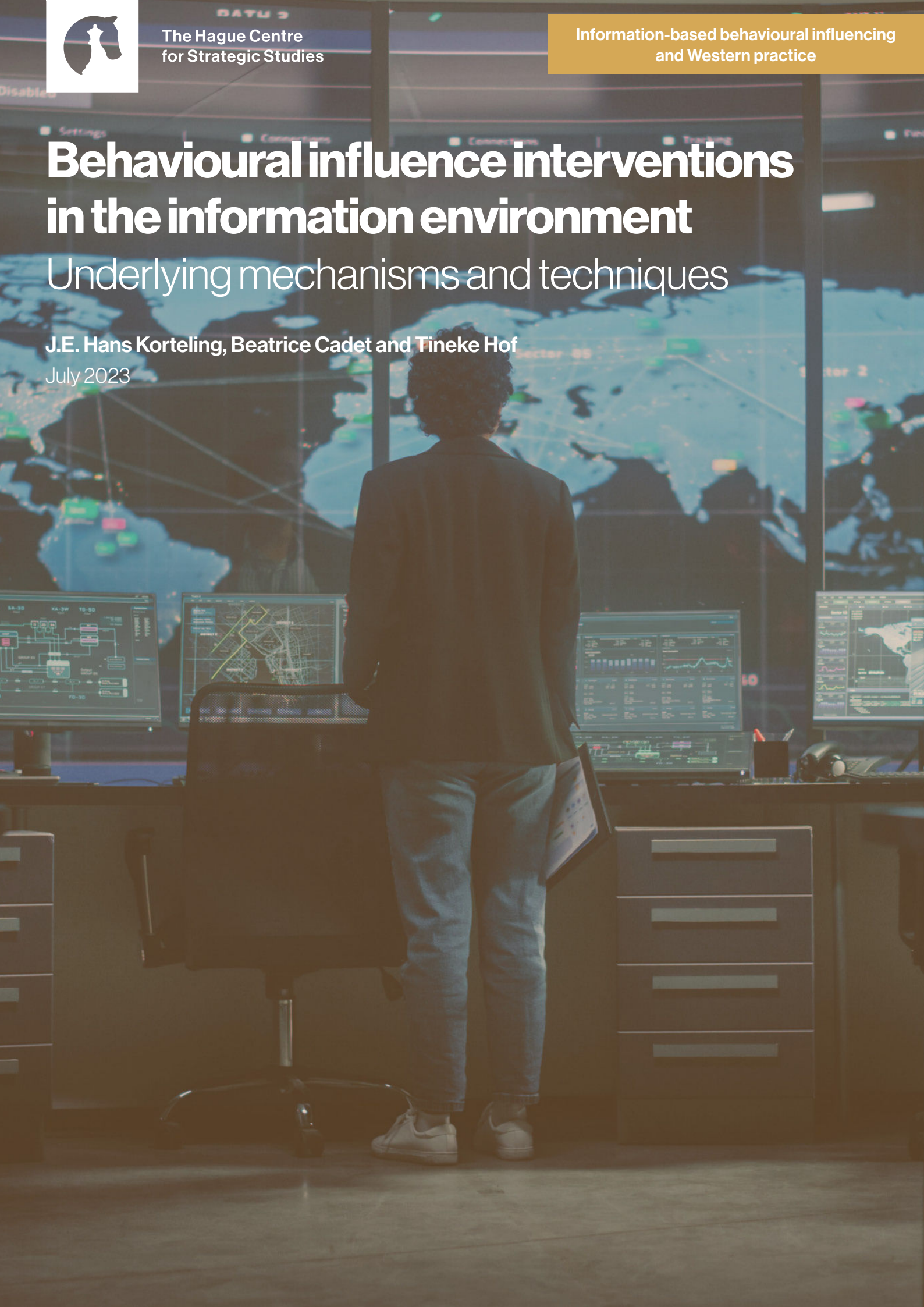
Underlying mechanisms and techniques

J.E. Hans Korteling, Beatrice Cadet and Tineke Hof

July 2023



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Paper 7

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Authors:
J.E. Hans Korteling, Beatrice Cadet and Tineke Hof

This paper is part of the *Information-based behavioural influencing and Western practice* paper series.

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This paper is published as part of the project Platform Influencing Human Behaviour, commissioned by the Royal Netherlands Army. The aim of this platform is to build and share knowledge on information-based behavioural influencing in the military context. We bring together international experts and practitioners from both military and academic backgrounds to explore the military-strategic, ethical, legal, and societal issues and boundaries involved. Responsibility for the content rests solely with the authors and does not constitute, nor should it be construed as, an endorsement by the Royal Netherlands Army.

Paper series: Information-based behavioural influencing and Western practice

The military application of information has a long history in influencing the outcome of war and conflict on the battlefield. Be it by deceiving the opponent, maintaining troop confidence, or shaping public opinion. These tactics are placed under the banner of influencing human behaviour. Behavioural influencing is the act of meaningfully trying to affect the behaviour of an individual by targeting people's knowledge, beliefs and emotions. Within the Dutch armed forces these tactics fall under title of Information Manoeuvre. With the ever-larger and more evasive employment of information-based capabilities to target human cognition, the boundaries of the physical and cognitive battlefield have begun to fade.

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For this paper series scholars, experts and policymakers submitted their papers on the employment of information-related capabilities to influence human behaviour in the military context. From the perspective of an individual European or NATO country's perspective. The Information-based behavioural influencing and Western practice paper series is edited by Arthur Laudrain, Laura Jasper and Michel Rademaker.

Seven papers will be published in this series. These are the following:

- **Deception as the Way of Warfare. Armed Forces, Influence Operations and the Cyberspace paradox.** By Colonel dr. Peter B.M.J. Pijpers, Netherlands Defence Academy and University if Amsterdam, and Brigadier-General prof. dr. Paul A.L. Ducheine, Netherlands Defence Academy and University of Amsterdam
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- **Cognitive Warfare as Part of Society: Never-Ending Battle for Minds.** By Robin Burda, Ph.D. candidate Security and Strategic Studies Masaryk University
- **Behavioural Influence Interventions in the Information Environment: Underlying Mechanisms and Technologies.** By dr. Hans Korteling (TNO), Beatrice Cadet (TNO), Tineke Hof (TNO)

Abstract

This paper outlines how the military can use (neuro)scientific and psychological insights in a systematic way to influence the judgement, reasoning, and decision-making of own, neutral, or opposing actors in favour of one's own position. First, we zoom in on the neuro-evolutionary origins of cognitive biases and their (subconscious) effects on human judgment and decision making. Cognitive biases are systematic and ingrained tendencies or distortions in human thinking that often do not comply with the tenets of logic, probability reasoning, and plausibility. We advocate that information warfare can be feasible and effective by capitalising on the known biases in human cognition. This notion is further elaborated in the form of a number of examples showing how these ingrained mechanisms may be used (often in a subtle way) in the offline and online information environment to influence decision making and behaviour. The abundance of this knowledge across various fields has to be translated into a framework and methodology consisting of e.g., subtle influence interventions, operational working procedures, risk-management strategies, and support tools. This methodology should not only be applicable for the effective execution of information warfare, but it also must fit within our democratic, juridical, and ethical principles and boundaries as well. In this paper we present some results and progress off our work in this direction.

Both Ukraine and Russia have been using information to influence behaviours and cognitions within their own military and of foreign nations and groups.

1. Introduction

1.1. Information warfare in the battlefield and beyond

The conflict in Ukraine has illustrated the enhanced role of information, communication, and deception within and beyond the battlefield. Both Ukraine and Russia have been using information to influence behaviours and cognitions within their own military and of foreign nations and groups. While such intensive campaigns seem not unpreceded, its present emergence is characterised by changing geopolitical relationships in which Western capabilities and values become less and less dominant.[1] Compared to the Eastern cultures, the Western World historically has been less comfortable with psychological deception as a recognised tool for military influence. Western culture and open democracy are protected by respective governments within layers of highly valued ethical checks and balances in the open-source mass-media. Overt lying and feigning of information from sources, such as the government and/or organisations, is not considered acceptable. Therefore, the Dutch Armed Forces and Western research studies have focused on information warfare from a reactive, defensive perspective (e.g., debunking of disinformation or media literacy training). In line with this, lower priority was given to developing proactive and offensive information interventions (or "stratagems") to execute information warfare. According to research,[2], [3] this defensive and reactive focus may be a risky approach given the deep and long-term nature of hybrid and information campaigns. In response to this vulnerability, the Western armed forces have been increasingly concerned and engaged in recent years with the development of information as an instrument of power for effective influencing human behaviour[4] and the concept of Information operations.[5]

1 Nick Verrall, Lee Mason, and Ben Ellis, "Military Deception. Baseline Understanding for Contemporary Information Activities" (DSTL/TR90060 v1.0, 2016).

2 Verrall, Mason, and Ellis, "Military Deception"

3 Johan E. Korteling and Maaike Duistermaat, "Psychological Deception. TNO 2018 R11532" (Soesterberg: TNO Defence, Safety & Security, 2018).

4 Lotje Boswinkel et al., "Weapons of Mass Influence: Shaping Attitudes, Perceptions and Behaviours in Today's Information Warfare" (The Hague: The Hague Centre for Strategic Studies, 2022).

5 NATO, "AJP-10.1 Allied Joint Doctrine for Information Operations" (NATO Standardization Office (NSO), March 2023).

This growing focus on the weaponization of information[6] implies that our own allied militaries need to develop deeper knowledge concerning the underlying neuro-evolutionary and psychological mechanisms that determine the influence of information (words, images) on human cognition, decision making, and behaviour. Important in this regard is the significant role that subconscious (heuristic, intuitive, pre-reflective, automatic) thought processes play in the judgement of situations, generation of decisions and the causation of behaviour.[7], [8] In general, cognitive mechanisms and environmental elements can be used effectively to subconsciously induce or trigger irrational or biased thinking in individuals and populations. For example: a pattern of small unthreatening 'truthful' facts may be deliberately communicated only to pre-establish one's own reputation for truth-based credibility. This may prepare an opponent to better accept a more significant behavioural request later.

A mix of unconventional and irregular methods is increasingly able to attract attention and exert influence within and beyond the traditional theatre by using fast-spreading internet technology and social media.

This article describes how such influence interventions can take advantage of unconscious cognitive mechanisms and principles to influence (distort, exploit, manipulate) decision-making processes in people in such a way that their perception, will and behaviour become (more) in line with the intentions of the sender. The principles regarding cognitive mechanisms and behavioural influence presented in this paper build on previous and current work in which TNO provided a neuro-evolutionary explanation for the systematic distortions (biases) in human decision making.[9], [10], [11] This paper's goal is to determine how these insights can be used to distort, exploit, or manipulate decision-making processes[12], [13] in opposing (or neutral) actors (individuals and groups) and how this can help to build a methodological framework.

1.2. The enhancing role of technology

Information has always been used to shape adversary thinking and decision-making. However, rapid advances in information and communication technologies have added to their centrality.[14] Not only has the load of information that people consume greatly increased; its production is nowadays a highly decentralised network.[15] A mix of unconventional and irregular methods is increasingly able to attract attention and exert influence within and beyond the traditional theatre by using fast-spreading internet technology and social media.[16] These technologies

6 Alicia Wanless and Michael Berk, "The Changing Nature of Propaganda," in *The World Information War: Western Resilience, Campaigning, and Cognitive Effects*, ed. Timothy Clack and Robert Johnson (Routledge/Taylor and Francis Group, 2021).

7 Ben R. Newell and David R. Shanks, "Take the Best or Look at the Rest? Factors Influencing 'One-Reason' Decision Making," *Journal of Experimental Psychology: Learning, Memory, and Cognition* 29, no. 1 (2003): 53–65, https://doi.org/10.1037/0278-7393.29.1.53.

8 Max Velmans, "What Makes a Conscious Process Conscious?," *Behavioural and Brain Sciences* 37, no. 1 (2014): 43–44, https://doi.org/10.1017/S0140525X13002085.

9 Johan E. Korteling et al., "Neurowetenschappelijke Mechanismen van Cognitieve Bias. TNO 2016 R11451" (Soesterberg: TNO Earth, Life & Social Sciences, 2016).

10 Johan E. Korteling, Anne-Marie Brouwer, and Alexander Toet, "A Neural Network Framework for Cognitive Bias," *Frontiers in Psychology* 9 (2018): 1561, https://doi.org/10.3389/fpsyg.2018.01561.

11 Johan E. Korteling and Alexander Toet, "Cognitive Biases," in *Encyclopedia of Behavioural Neuroscience*, ed. Sergio Della Sala, 2nd ed. (Elsevier, 2021), 610–19.

12 Cassandra Brooker, "The Effectiveness of Influence Activities in Information Warfare" (Australian Army Research Centre, 2021).

13 Lotje Boswinkel et al., "Weapons of Mass Influence".

14 Wanless and Berk, "The Changing Nature of Propaganda"

15 Aiden Hoyle et al., "Web of Lies: Mapping the Narratives, Effects, and Amplifiers of Russian Covid-19 Disinformation," in *COVID-19 Disinformation: A Multi-National, Whole of Society Perspective*, ed. Ritu Gill and Rebecca Goolsby (Cham: Springer International Publishing, 2022), 113–41.

16 Rob De Wijk, "Hybride Dreigingen," *Magazine Nationale Veiligheid En Crisisbeheersing. Thema: Hybride Dreigingen* 5/6 (2016): 14–15.

ensure that narratives and fabricated messages travel around the world quickly. Moreover, the internet and social media may easily lead to more extreme opinions in the public by algorithms that confirm and aggravate preconceived convictions. Therefore, the creation and deployment of information interventions can be enabled or enhanced by various kinds of techniques and technologies, social media being a favoured channel to connect by a various range of audiences. The role of technology goes beyond its role as a digital platform. Its pervasive nature makes it a tool in the creation and spreading of information, turning it into a necessary aspect to acknowledge in the creation of information interventions. For example, recognising the current methods of the algorithms of a social media platform and integrating it into the creation of a piece of content can greatly influence its reception by audiences.[17] That is why the sections below also pay attention to the role of technology in the use of subconscious influence interventions.

1.3. Subconscious information processing mechanisms and behaviour influence

'Subconscious psychological manipulations' do not always or necessarily have to remain (completely) unnoticed by the recipient, as is the case for most commercial advertisements.

Following the work of Tversky and Kahneman,[18], [19] decision making can be accomplished through a more conscious and deliberate processing mode (Type 2) or through a more subconscious, intuitive processing mode (Type 1).[20], [21] In this study we address those types of psychological influencing methods in which recipients should not attend to the quality of arguments presented (Type 2), but to other, more subconsciously processed, features of the communication (Type 1). We also focus on the methods that deliberately intend to affect audiences in such a way that the outcomes will be advantageous to the objectives of the sender (or actor). For this purpose, these 'subconscious psychological manipulations' do not always or necessarily have to remain (completely) unnoticed by the recipient, as is the case for most commercial advertisements.

In this paper we discuss insights and knowledge of subconscious mechanisms related to human cognition, judgement and decision making, to disrupt the decision-making capabilities of opposing forces. This knowledge rests on four basic principles:

1. Human information processing is largely determined by subconscious and intuitive processes, which do not involve intentional analysis and calculation,[22]
2. This 'intuitive (a)rationality' is characterised by predictable, systematic, specific, and universal thinking-tendencies and -distortions, called biases,[23], [24], [25], [26], [27]

17 Hoyle et al. "Web of Lies", 113-41.

18 Amos Tversky and Daniel Kahneman, "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, no. 4157 (1974): 1124–31, https://doi.org/10.1126/science.185.4157.1124.

19 Amos Tversky and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice," *Science* 211, no. 4481 (1981): 453–58, https://doi.org/10.1126/science.7455683.

20 Daniel Kahneman, *Thinking, Fast and Slow* (London: Penguin Books, 2011).

21 Keith E. Stanovich and Richard F. West, "Individual Differences in Reasoning: Implications for the Rationality Debate?," *Behavioral and Brain Sciences* 23, no. 5 (2000): 645–726, https://doi.org/10.1017/S0140525X00003435.

22 Velmans, "What Makes a Conscious Process Conscious?", 43-44.

23 Jonathan St. B. T. Evans, "The Heuristic-Analytic Theory of Reasoning: Extension and Evaluation," *Psychonomic Bulletin & Review* 13, no. 3 (June 2006): 378–95, https://doi.org/10.3758/bf03193858.

24 Jonathan St. B. T. Evans, "Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition," *Annual Review of Psychology* 59, no. 1 (January 2008): 255–78, https://doi.org/10.1146/annurev.psych.59.103006.093629.

25 Kahneman, Thinking, Fast and Slow

26 Steven A. Sloman, "The Empirical Case for Two Systems of Reasoning.," *Psychological Bulletin* 119, no. 1 (1996): 3–22, https://doi.org/10.1037/0033-2909.119.1.3.

27 Stanovich and West, "Individual Differences in Reasoning"

3. Biases are systematic, specific, and universal because they are caused by ingrained neural and evolutionary mechanisms that are intrinsic to the functioning of the brain,[28], [29], [30]
4. Information warfare can capitalise on the systematic character of intuitive (a)rationality to manipulate opposing forces into suboptimal decision making and behaviour.[31]

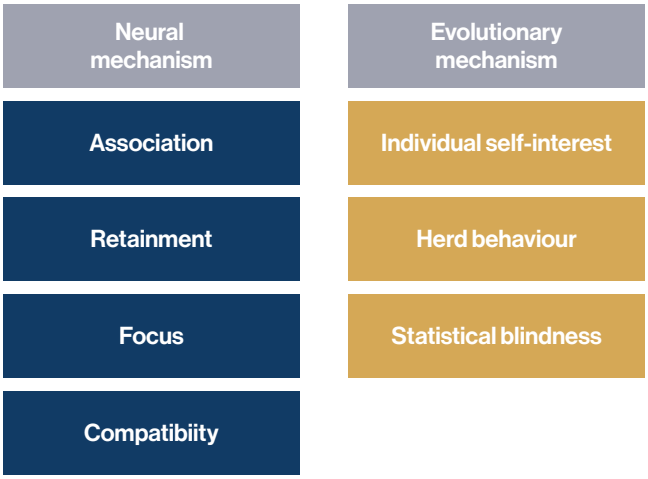
Neuro-evolutionary mechanisms

Our psychological traits, instincts and intuitions result from the way the brain works, determined by its inherent and structural features and mechanisms of biological neural networks. For example, systematic cognitive errors and decision bias may arise from the associative and physical properties of biological neural networks, or on primitive survival strategies or practical heuristics that once had important survival-value for our ancestors. This paper explains intuitive (a)rationality by two overall principles that governed the evolution of the human brain: 1) Structural neural mechanisms and 2) Functional evolutionary mechanisms.

The evolutionary mechanisms which are relevant for information interventions comprise Individual self-interest, Herd behaviour, and Statistical blindness.

The first set of principles covers neural mechanisms arising from structural characteristics (or principles) of the functioning of the brain as a biological neural network. The neural mechanisms which are relevant for information interventions comprise Association, Compatibility, Retainment and Focus. The second set of principles involves evolutionary tendencies which have a different, more functional, origin. These functional mechanisms were once beneficial for the survival and reproduction of our ancestors, like preferring sweet and fat food or short-term thinking. Though once useful, these dispositions may neither be useful or rational in today's world. The evolutionary mechanisms which are relevant for information interventions comprise Individual self-interest, Herd behaviour, and Statistical blindness.

Figure 1. Overview of neuro-evolutionary mechanisms



In the following chapters, we present the most relevant neuro-evolutionary mechanisms influence interventions, and suggestions and examples for application. That is, how these principles can be employed to affect audiences and help to reach behavioural effects.

28 Korteling et al., "A Neural Network Framework for Cognitive Bias"

29 Korteling et al., "Neurowetenschappelijke Mechanismen van Cognitieve Bias"

30 Korteling and Toet, "Cognitive Biases"

31 Richards J. Heuer, "Cognitive Factors in Deception and Counter Deception," in *The Art and Science of Military Deception*, ed. Hy Rothstein and Barton Whaley (Artech House, 2013), 105–33.

2. How behavioural influence interventions may capitalise on the structural characteristics of neural information processing.

The brain is not a logical machine like a digital computer that works and calculates based on strict mathematical routines and logical algorithms. In contrast, it is a complex associative network of physically interconnected neurons evolved to perform physical, biological, and perceptual-motor functions. Since these neural mechanisms are basic and conditional for each normal brain they lead to systematic, specific, and universal inclinations and tendencies in all human beings, i.e., neural biases.[32], [33] Below, we first provide brief descriptions of four neural mechanisms causing human judgement and decision to deviate from the rules of logic and probability: Association, Compatibility, Retainment, and Focus.[34] This is followed by intervention principles and examples (historic or fictional) of how this knowledge can be applied in actual military interventions to influence decisions and achieve behavioural effects.

The brain is strongly inclined to search and find all kinds of connections even if those connections are not correct and/or are based on coincidence.

2.1. Association

2.1.1. Neural mechanism

The brain associatively searches for relationships, coherence, and patterns (correlation, coincidences) in the available information.[35], [36]

Establishing and maintaining associative connections (correlations, coherence, patterns) is the most basic operation of the brain as a neural network.[37], [38] The brain is strongly inclined to search and find all kinds of connections even if those connections are not correct and/or are based on coincidence. We make connections between coincidences that have no causal relationships. This is how superstition, conspiracy theories, and various kinds of false knowledge (quacks) arise. Many preferences, aversions, or stereotypes are based on (learned) associations. Creating or maintaining positive associations with products for example, is one of the fundamentals of advertising. This associative bias toward seeking and seeing meaningful patterns and relationships (that also may not exist) can be truly relevant for information interventions and strategic analyses.[39] This neural mechanism can be enhanced by behaviours on social media where the time taken to examine the truth worthiness of content is usually extremely short.

32 Wim Van de Grind, *Natuurlijke Intelligentie. Over Denken, Intelligentie En Bewustzijn van Mensen En Andere Dieren* (Amsterdam: Uitgeverij Nieuwezijds BV, 2007).

33 Korteling et al., "A Neural Network Framework for Cognitive Bias"

34 Korteling et al., "A Neural Network Framework for Cognitive Bias"

35 Donald O. Hebb, *The Organization of Behaviour* (New York: Wiley, 1949).

36 Carla J. Shatz, "The Developing Brain," *Scientific American* 267, no. 3 (1992): 34–41, https://doi.org/10.1038/scientificamerican0992-60.

37 Edward L. Thorndike, "A Proof of the Law of Effect," *Science* 77, no. 1989 (1933): 173–75, https://doi.org/10.1126/science.77.1989.173-a.

38 Edward L. Thorndike, "The Law of Effect," *The American Journal of Psychology* 39, no. 1/4 (1927): 212–22, https://doi.org/10.2307/1415413.

39 Heuer, "Cognitive Factors in Deception and Counter Deception"

2.1.2. Utilising Association principles in interventions

Positive/negative association

Own or allied organisations, persons, or forces can be positively associated (and thus promoted) with e.g., objects, figures, images, or symbols that emanate high social status and success. For example, Putin depicted as a sportsman or sitting on a fierce horse or celebrities or experts can convey credibility that goes beyond the mere execution of that person's official duties as an expert.[40] The opposite can be done with opponents, i.e., associate them with "the negative" and everything of "low status" to undermine the support they receive from others.

Spurious causality

Since the brain is very sensitive to detect relations between events that may coincide (in time and place or other possible common features) we are prone to postulate erroneous causalities among events and/or objects. In other words, we tend to connect the wrong causes to (an) effect(s). An act of influence can then be to highlight accidents or effects of possible disasters in the opponent's country and attribute these to his own failing regime and/or lack of precautionary actions.

Narration

A story made up of associated, consistent, and believable elements is more easily accepted and better remembered than neutral, unrelated facts.[41], [42] Local people (or defectors) can therefore be encouraged to tell stories of bad experiences and offenses related to the adversary. Spreading this through (social) media can have much more impact on public opinion than publishing naked statistics and facts. Stories can also be used (or constructed) to create or reinforce people's feelings of belonging (patriotism) and commitment to certain groups or ideologies, which in turn can have effect on e.g., societal cohesion and support.

Stories can also be used (or constructed) to create or reinforce people's feelings of belonging (patriotism) and commitment to certain groups or ideologies.

The table below shows examples of how association principles can be utilised in information interventions intended to induce certain desired attitudinal and/or behavioural effects in target audiences, including an illustrative (historic or fictional) example.

40 William G. Hansen, *Influence: Theory and Practice* (Naval Postgraduate School, 2013).

41 Robyn M. Dawes, *Everyday Irrationality: How Pseudo-Scientists, Lunatics, and the Rest of Us Systematically Fail to Think Rationally* (Routledge, 20218).

42 Mark Turner, *The Literary Mind: The Origins of Thought and Language* (Oxford University Press, 1996).

Table 1. Examples utilising association principles

Desired effects:
- Bolster the reputation, credibility or authority of a targeted organisation, group, or person (promote).
- Harm the reputation, credibility or authority of a targeted organisation, group, or person (discredit).

Target audience:
- Local population of a region or country.

Utilising principles:
- Associate own or allied organisations, persons, or forces with positive objects, figures, images, or symbols that emanate high social status and success.
- Associate opponents with negative, low-status elements.
- Attribute accidental (coincidental) problems of the opponent (which will statistically always arise) to his own failure and/or erroneous deliberations.
- Encourage local influencers to share narratives of bad experiences and offenses related to the adversary.
- Use positive stereotypes or generalisations to portray own individuals, groups, or forces in a positive way and do the opposite with own actors or parties.

Historic example:
- In 2022, after the outbreak of the war in Ukraine, multiple exhibitions began all over Russia, such as one in Moscow called: "NATO: A Chronicle of Cruelty". The exhibitions showed raw images of violence, which were blamed on NATO actors. Scary music played in the background adding to the emotional impact.

2.2. Compatibility

We are biased to remain consistent with what we already know, think or have done.

2.2.1. Neural mechanism

Associative pick-up and processing of information is substantially facilitated when it is compatible (match, consistent) with the current state of the brain. Therefore, we accept or prefer information or choices that are compatible with what we already know, understand, expect and/or value.[43], [44]

Input that corresponds to pre-existing, strong, or activated ('priming') circuitry in the brain, provides a stronger activation (resonance) than input that does not.[45], [46] Information that is new, or that is different from, or in conflict with, the current (neural) frame of reference, is not easily assimilated or integrated and is therefore actually filtered away. In line with this, people strive for consistency, avoid contradictions, and stick to the status quo and default to the choices that were previously made. So, we are biased to remain consistent with what we already know, think or have done. Like association this property is fundamental to the inner workings of the brain. This leads to very persistent, unconscious and common biases, such as selective perception, cognitive dissonance,[47] and the confirmation bias.[48] This means that it is a first mandatory step to know and understand your target audience.[49], [50] That is: Know

43 Jian-Xin Bao, Eric R Kandel, and Robert D. Hawkins, "Involvement of Pre- and Postsynaptic Mechanisms in Posttetanic Potentiation at Aplysia Synapses," *Science* 275, no. 5302 (1997): 969–73, https://doi.org/10.1126/science.275.5302.969.

44 Korteling et al., "A Neural Network Framework for Cognitive Bias"

45 Bao et al., "Involvement of Pre- and Postsynaptic Mechanisms"

46 Kenneth I. Forster and Chris Davis, "Repetition Priming and Frequency Attenuation in Lexical Access," *Journal of Experimental Psychology: Learning, Memory, and Cognition* 10, no. 4 (1984): 680–98, https://doi.org/10.1037/0278-7393.10.4.680.

47 Leon Festinger, *A Theory of Cognitive Dissonance* (Stanford University Press, 1957).

48 Raymond S. Nickerson, "Confirmation Bias: A Ubiquitous Phenomenon in Many Guises," *Review of General Psychology* 2, no. 2 (1998): 175–220, https://doi.org/10.1037/1089-2680.2.2.175.

49 Timothy L. Thomas, "Reflexive Control in Russia: Theory and Military Applications," *Reflexive Processes and Control* 2, no. 1 (2002): 60–76.

50 Hansen, Influence

their 'reflexes' and how they will select, analyse, and weigh information and events in order to come to their choices and responses. Religious and cultural beliefs and symbols may be excellent breeding grounds to mobilise social media and thereby to provoke politically motivated over-reactions that may destabilise the fundaments of societies. In the digital realm, this can be amplified by the algorithms themselves which prioritise content similar to the ones that triggered a reaction from the user (a like, a comment, a click). Additionally, people will tend to follow similar people and create their own cognitive bubble.[51]

2.2.2. Utilising Compatibility principles in interventions

Providing confirming evidence

Because we prefer to make choices that justify our previous actions, the effective communicator must build on what the target audience already thinks or knows.

People tend to search for, interpret, focus on, and remember information in a way that confirms their existing ideas, expectations, or preconceptions. When trying to win support for an offensive or defensive operation among your own public, provide them then, as much as possible, with information and evidence that confirms, or is in line, with your action. Take care to avoid possible disconfirming evidence. Always start with some (insignificant), but undeniable, true information in order to create trust.[52]

Selective alertness

Personnel working on watch offices, like the military police, are extensively trained and briefed to recognise certain indicators and they have often imagined and rehearsed scenarios that include these watched-for events. Therefore, they tend to overestimate the probability of whatever it is they are watching for. That is, they see what they expect to see because these elements are on top of their minds.[53] In this way the opponents' watch officers may relatively easy be provoked or deceived to regularly issue false alerts for impeding events that are in fact not planned, so that future alerts will be considered less seriously (the 'cry wolf effect').

Incremental steps

Because we prefer to make choices that justify our previous actions, the effective communicator must build on what the target audience already thinks or knows.[54] Changes are best implemented gradually and in small steps. Seduction often happens by first getting people to take small steps in the desired direction ('foot in the door'). Once this (small) step has been taken, people will prefer to make their next decisions conform to their previous behaviour.

Recognition and simplicity

Since there is already so much noise and confusion between what one intends to send and how the receiver understands that message, it is recommended to send the most recognizable and simple signals or messages to ensure accurate message transference.[55]

51 Samuel C. Rhodes, "Filter Bubbles, Echo Chambers, and Fake News: How Social Media Conditions Individuals to Be Less Critical of Political Misinformation," *Political Communication* 39, no. 1 (May 1, 2021): 1–22, https://doi.org/10.1080/10584609.2021.1910887.

52 Heuer, "Cognitive Factors in Deception and Counter Deception"

53 Heuer, "Cognitive Factors in Deception and Counter Deception"

54 Wilbur L. Schramm, *How Communication Works: The Process and Effects of Mass Communication* (Urbana: University of Illinois Press, 1954).

55 John T. Cacioppo and Richard E. Petty, "Effects of Message Repetition on Argument Processing, Recall, and Persuasion," *Basic and Applied Social Psychology* 10, no. 1 (1989): 3–12, https://doi.org/10.1207/s15324834basp1001_2.

Recognisable and simple information will be more easily picked up, processed, and thus accepted.

Table 2. Examples utilising compatibility principles

Desired effects:
- Influence opinions and beliefs and/or increase support for specific ideas, actors, organisations, or activities.

Target audience:
- Unsupportive groups.

Utilising principles:
- Start with some (insignificant), but undeniable, true information to create trust.
- Use incremental steps. Once a small commitment is made people will tend to respond in ways that justify earlier decisions.
- Introduce and carry out changes and transformations in a gradual way.
- Provide confirming evidence.
- Avoid providing disconfirming evidence.
- Convey messages in a most recognisable and simple way.
- Increase support for decisions, measures, or actions by focusing on their positive aspects and effects.
- Provoke active participation (unforced and forced) to build consistent behavioural habits.
- Highlight the resources that had to be invested and the offers that had to be made to obtain a conquered object in order to legitimate new investments for the public, for instance to maintain or defend it.

Historical examples:
- The seemingly unresolvable conflict between Israel and Palestine over the Westbank may be caused by the fact that both parties have already invested a great deal in maintaining or recovering this area, making it increasingly difficult for them to abandon their claims.
- The USS Vincennes debacle in 1988 exemplified the dangers of selective perception or tunnel vision. Amid heightened tensions with Iran, the U.S. Navy cruiser mistakenly shot down an Iranian passenger plane, tragically claiming 290 innocent lives. The crew's narrow and selective focus on perceiving threats led to a catastrophic mistake, underscoring the importance of comprehensive situational awareness in military operations."

As an associative neural network, the brain has much more difficulty with ignoring information once it has been processed negating operations.

2.3. Retainment and anchoring

2.3.1. Neural mechanism

Once received information is anchored in the neural circuits of the brain, such that it cannot simply be erased, denied, undone, or ignored. This also counts for irrelevant or counterproductive information.[56], [57]

As an associative neural network, the brain has much more difficulty with ignoring information once it has been processed negating operations. Everything that comes in is processed to a certain degree and affects the network ('Don't think of a pink elephant!'). This is so because information in a nervous system is embedded in its physical-chemical structure (its wiring, or 'wetware'). So, whatever has been activated or captured cannot simply be (temporarily) discarded, deleted, or ignored. Having to discard or ignore information once integrated into neural circuitry takes effort, feels uncomfortable (loss), and/or is sometimes hardly possible. This applies increasingly as the information is dominant, lively, or for whatever reason 'loaded' with emotions.[58]

56 Korteling et al., "A Neural Network Framework for Cognitive Bias"

57 Korteling and Toet, "Cognitive Biases"

58 Korteling et al., "A Neural Network Framework for Cognitive Bias"

2.3.2. **Utilising retainment principles in interventions**

Anchoring

Anchoring occurs when individuals use an initial piece of information to make subsequent judgements. Once an anchor is set, other judgements are made by adjusting away from that anchor, and there is a bias toward interpreting other information around the anchor.[59] To gain more popular support, you can start with communicating the positives, e.g., that a certain area has been recaptured. This can then be nuanced later by drawing up the balance of the total.

Disinformation and distraction

A well-known example of providing distracting information in ambiguity-inducing deceptions is the spreading of a large amount of information and theories by the Russian Ministry of Foreign Affairs that could 'explain' the disaster shortly after the MH17 attack.

When the objective is to distort and to induce uncertainty or ambiguity, the deliberate fabrication and dispersion of irrelevant or erroneous information will distract an opponent's attention from the 'real issue'. Feigned manoeuvres or military objects/targets (like fake tanks) on the battlefield are good examples of this principle. A well-known example of providing distracting information in ambiguity-inducing deceptions is the spreading of a large amount of information and theories by the Russian Ministry of Foreign Affairs that could 'explain' the disaster shortly after the MH17 attack. This disinformation included about ten different possible causes that all could explain the crash without any Russian involvement.

Repetition and reinforcement

This idea was already formulated by Joseph Goebbels as follows: 'If you repeat a lie often enough, it becomes the truth'. The more and the longer people are exposed to misleading data that may generate an initial and possibly erroneous impression, the more resistance will develop to changing this initial impression. Inaccurate notions generated by false data may thus persist even after much correct information has been received to clarify the initial impression. This is closely related to the Sleeper effect, i.e., remembering the information (or message) itself better than the nature or credibility of the underlying source.[60]

Framing

The influence of a message is determined not only by its content, but above all by its form, i.e., how it is communicated or presented, i.e., the frame.[61] The frame is usually easily and quickly processed on a more intuitive and subconscious level than the content of the message, which requires slow, deeper, and more deliberate information processing. Each message can be presented, or framed, in numerous ways, which may have strong impact on the way a message will be judged. Following the attacks on 9/11, George W. Bush framed opponent governments as belonging to the "axis of evil" and framed the solution as a "global war on terror". These frames helped to legitimate offensive actions against governments that were supposed to support terrorist attacks against the USA. This framed naming also provides

59 Tversky and Kahneman, "Judgment under Uncertainty"

60 G. Tarcan Kumkale and Dolores Albarracín, "The Sleeper Effect in Persuasion: A Meta-Analytic Review.," *Psychological Bulletin* 130, no. 1 (2004): 143–72, https://doi.org/10.1037/0033-2909.130.1.143.

61 Tversky and Kahneman, "The Framing of Decisions"

'substance' to vague or abstract concepts, Nietzsche termed this *verdingung*,[62] and nowadays it is known as reification.[63]

Table 3. Examples utilising retainment principles

Desired effects:
- To cause to have a wrong impression about someone or something (mislead)

Target audience to receive information interventions:
- Decision making units, local audiences

Utilising principles:
- First deliver the news the way you want it to be received and interpreted. At a later moment, extend the message with the less welcome nuances and details.
- Fabricate and disperse irrelevant or erroneous information to distract an audience's attention from the 'real issue'.
- In order to provoke uncertainty or delay, expose the audience/target to ambiguous, irrelevant, alternative or misleading data extensively and repeatedly.
- Reward and reinforce the desired behaviour as much and frequent as possible.
- Pay attention to how you frame the message.
- Magnify the emotional impact of a message, for example by visual tricks and images.
- Prioritise one aspect of a narrative.
- Do not hesitate to use arguments from a hindsight perspective and/or from knowledge on the outcomes.
- Focus on (clear, overt) outcomes instead of on (hidden, covert, underlying) processes.

Historical examples:
- Around 70% of the Americans still believed two years later that Saddam Hussein was actually involved in the preparation of the 9/11 attacks, even though the Congress and the Administration had publicly corrected the originally disseminated information (by the US government) that Iraq was connected to Al Qaeda.[64] So: first deliver the news the way you want it to be received and interpreted, later the message may be extended by the less welcome nuances and details.
- The quasi-psychiatric frame "Russophobia" is used by the Russian government to dismiss any criticism of Russia as a hypocritical act of the West by not living up to its own values: not being tolerant towards Russia.

The brain works like a magnifying glass. It has a strong tendency to trust and focus on a limited set of dominant information.

2.4. Focus (Simplicity)

2.4.1. Neural mechanism

The brain associatively focuses on dominant information, i.e., known knowns that easily pop up in the formation of judgments, ideas, and decisions. The fact that there is other (possibly relevant) information (unknowns) is insufficiently recognised.[65], [66], [67], [68]

The brain works like a magnifying glass. It has a strong tendency to trust and focus on a limited set of dominant information. This dominance is determined by the amount of attention paid to it before, the subjective impression it made, how long ago it happened, or how often, how

62 Friedrich Nietzsche, *De Vrolijke Wetenschap* (1882; repr., De Arbeiderspers, 1999).

63 Allen L. Frances and Thomas Widiger, "Psychiatric Diagnosis: Lessons from the DSM-IV Past and Cautions for the DSM-5 Future," *Annual Reviews of Clinical Psychology* 8 (2012): 109–30, https://doi.org/10.1146/annurev-clinpsy-032511-143102.

64 Dana Milbank and Claudia Deane, "Hussein Link to 9/11 Lingers in Many Minds," *Washington Post*, September 6, 2003, https://www.washingtonpost.com/archive/politics/2003/09/06/hussein-link-to-911-lingers-in-many-minds/7cd31079-21d1-42cf-8651-b67e93350fde/.

65 Kahneman, Thinking, Fast and Slow

66 Korteling et al., "A Neural Network Framework for Cognitive Bias"

67 Korteling and Toet, "Cognitive Biases"

68 Tversky and Kahneman, "Judgment under Uncertainty"

clear it occurred, and how well it associatively fits with other pieces of information.[69] If an idea or thought clearly comes to mind (for whatever reason), it must be important. Relevant information that is only weakly represented in the network ('in memory') has minor impact on the outcome of a neural activation process. At the same time, we have little regard for the fact that there is a lot we are not aware of or what we do not know ('blind spots'). Consequently, in making judgements, predictions, and estimations we tend to ignore nuance, ambiguity, and completeness. We also do not take sufficiently into account the possible effects of, for example, circumstantial or coincidental factors. Overall, this may often lead to rather unsophisticated and short-cut ways of judgement and decision making. This mechanism is also substantially amplified on social media where the flow of information is overwhelming and images and headlines are predominant.[70], [71]

When we observe another's behaviour, we tend to overestimate the importance of personal traits and dispositions (such as character or intelligence) in explaining that behaviour.

2.4.2. Utilising focus principles in interventions

Immediate reward

Immediate reinforcements are usually better recognised or seen; they have more effect.[72], [73] This attractiveness of immediate gratification, or direct reinforcement, means that timely rewards have more persuasive power than promises of long-term gains or consequences. For example, it may be fruitful to seduce an opponent by prompt (and relatively minor) personal success, when this likely leads to significant negative overall consequences in the long term. Of course, the principle of immediate reward could also be used to enhance motivation in the own forces. The provision of honour and decoration should not be postponed too long. The same counts for winning the support of local populations: immediate help or recognition of their problems will be the best reward.

Fundamental Attribution error

When we observe another's behaviour, we tend to overestimate the importance of personal traits and dispositions (such as character or intelligence) in explaining that behaviour.[74] This may be because we lack knowledge of this person's circumstances or his behaviour in other circumstances. As countries may have quite different perceptions when judging each other's behaviour, this may sow the seeds for mistrust and misunderstanding. In this way, an opposing party may be easily discredited by assuming hostile intent (or wickedness) while the other nation's actions are in fact merely normal responses to situational pressures or constraints. On the other hand, one's own behaviour is explained by accidental circumstances. This keeps the narrative of good against evil opponent intact.

Cherry picking

Intelligence analysts and decision makers generally need to account for missing data in their calculations and estimations. However, on the basis of the Focus principle ordinary people tend to overlook the absence of evidence very easily, and thus they will tend to ignore this fact.

69 Kahneman, Thinking, Fast and Slow

70 Els E. Duchateau-Polkerman, "Hoe Perceptie Ons Veiligheidsniveau Beïnvloedt," *Militaire Spectator* 185, no. 1 (2016): 4–18.

71 Thomas E. Powell et al., "A Clearer Picture: The Contribution of Visuals and Text to Framing Effects," *Journal of Communication* 65, no. 6 (2015): 997–1017, https://doi.org/10.1111/jcom.12184.

72 Thorndike, "A Proof of the Law of Effect"

73 Thorndike, "The Law of Effect"

74 Lee Ross, "The Intuitive Psychologist and His Shortcomings: Distortions in the Attribution Process," in *Advances in Experimental Social Psychology*, ed. Leonard Berkowitz, vol. 10 (Academic Press, 1977), 173–220.

Deception is thus unlikely to fail due to information that is *not* provided. Therefore, in setting up a deception or disinformation operation, it is generally not needed to invest all available efforts in providing maximum possible 'evidence' that is intended to confirm the deception. As stated before: consistency is dominant,[75] so cherry-pick only the most welcome information that supports the message that you want to convey.

Decision-making of modern people is still strongly modulated and affected by (subconscious) intuitions based on these old survival principles.

Table 4. Examples utilising focus principles

Desired effects:
- Restore confidence and dispel fear (reassure).
- Build trust and relationships.

Target audience:
- Local audiences, key leaders.

Utilising principles:
- Acknowledge and reward desired, beneficial effects immediately.
- Provide short-term gratifications instead of promising long-term benefits.
- Attribute an opponent's failures to its traits and dispositions (e.g., failing leadership).
- Attribute an opponent's success to accidental circumstances.
- Attribute own failures or weaknesses to accidental circumstances.
- Attribute own successes or strengths to traits and dispositions.
- Focus on welcome information and omit unwanted information.
- Use concrete figures and vivid examples to convince people.
- Provide vague, abstract or immaterial ideas or concepts with a recognisable name.

Historical example:
- There are many examples where only headlines, images or videos were displayed without context, which can easily lead to quick and incorrect assumptions, beliefs or conclusions. This also applies to photos of military vehicles parked near public buildings in Italy. These were used for COVID disinformation campaigns to create fear and spread the narrative that public services had been taken over. The photos came from France, before COVID.

3. How behavioural influence interventions may capitalise on the functional mechanisms of evolutionary adaptation.

Next to the inherent characteristics of biological neural networks, evolution has provided us with intuitive heuristics that turned out to be positive for our ancestors, who lived in small, close-knit groups under primal conditions. Their conditions favoured physical activity more than abstract thinking and symbolic calculation, compliant behaviour more than individuality, conformity to the group more than a search for truth, aversion of danger and loss more than striving for gain or profit, and quick and dirty decisions more than slow and concise analysis. Individuals who did not possess these favoured psychological and psycho-social characteristics disappeared from the gene pool. Decision-making of modern people is still strongly modulated and affected by (subconscious) intuitions based on these old survival principles.[76],

75 Kahneman, Thinking, Fast and Slow

76 Martie G. Haselton et al., "Adaptive Rationality: An Evolutionary Perspective on Cognitive Bias," *Social Cognition* 27, no. 5 (2009): 733–62, https://doi.org/10.1521/soco.2009.27.5.733.

[77], [78], [79], [80] Below, we first provide brief descriptions of three main evolutionary categories, i.e.: Individual self-interest, Herd behaviour, and Statistical blindness, followed by description of how this knowledge can be translated into ways of behavioural influence.

3.1. Individual self-interest

3.1.1. Evolutionary mechanism

For the sake of genetic reproduction, human behaviour is essentially aimed at maintaining the integrity and survival of one's own organism. This is often expressed in a tendency or need to prioritise personal interests relative to those of others.[81]

This self-preservation is a very basic emotional category, and thus we strive for all possible capacities and resources that contribute to the ultimate goals of survival and reproduction.

Natural selection is the replication of one's genes, which often comes at the expense of the survival of others' genes.[82] It has favoured humans who prioritise their personal interests over collective interests. Self-interest may also benefit (indirectly) from pro-social behaviour, supporting the group and one's position in the group (see also herd thinking). Research on social dilemmas has also indicated that we prioritise self-interest by demonstrating that most individuals make selfish choices, also when this may be detrimental for the community as-a-whole.[83] All organisms need to be aware of possible threats and need to avoid and protect themselves from harm. This self-preservation is a very basic emotional category, and thus we strive for all possible capacities and resources that contribute to the ultimate goals of survival and reproduction. Behavioural characteristics contributing to these goals are cautiousness (avoiding danger and loss), continuously striving for the better, and quick fading satisfaction once a goal has been obtained.

3.1.2. Utilising self-interest principles in interventions

Resolute action

Ancestors who tended to take action, for example running away when they suspected a possible threat, were probably more successful in the struggle for life that their more contemplating counterparts. In modern society, we still have a propensity to act or decide without analysis of sufficient information.[84] It is better to choose and lose than to never choose at all.[85] Good leaders are supposed to do the job and show quick, agile, and resolute action, without doubt, nuance, and holding back. Therefore, we may provoke or seduce opponents to take

77 Martie G. Haselton, Daniel Nettle, and Paul W. Andrews, "The Evolution of Cognitive Bias," in *The Handbook of Evolutionary Psychology*, ed. D.M Buss (John Wiley & Sons Inc., 2005), 724–46.

78 Johan. E. Korteling, Geerte L. Paradies, and Josephine P. Sassen-van Meer, "Cognitive Bias and How to Improve Sustainable Decision Making," *Frontiers in Psychology* 14 (2023), https://doi.org/10.3389/fpsyg.2023.1129835.

79 Ramsey M. Raafat, Nick Chater, and Chris Frith, "Herding in Humans," *Trends in Cognitive Sciences* 13, no. 10 (2009): 420–28, https://doi.org/10.1016/j.tics.2009.08.002.

80 Mark Van Vugt, Vladas Griskevicius, and P. Wesley Schultz, "Naturally Green: Harnessing Stone Age Psychological Biases to Foster Environmental Behaviour," *Social Issues and Policy Review* 8, no. 1 (2014): 1–32, https://doi.org/10.1111/sipr.12000.

81 Korteling and Toet, "Cognitive Biases"

82 John Tooby and Leda Cosmides, "Conceptual Foundations of Evolutionary Psychology," in *Handbook of Evolutionary Psychology*, ed. David M. Buss (New Jersey: John Wiley & Sons, Inc., 2005).

83 Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (1968): 1243–48, https://doi.org/10.1126/science.162.3859.1243.

84 Anthony Patt and Richard Zeckhauser, "Action Bias and Environmental Decisions," *Journal of Risk and Uncertainty* 21 (2000): 45–72, https://doi.org/10.1023/A:1026517309871.

85 Nathaniel J.S. Ashby, Tim Rakow, and Eldad Yechiam, "'Tis Better to Choose and Lose than to Never Choose at All," *Judgment and Decision Making* 12, no. 6 (2017): 553–62, https://doi.org/10.1017/S1930297500006689.

immediate, hasty, and risky action without sufficiently accounting for and weighting all available information and options. This can be done, for instance, by portraying an opponent leader as indecisive, by casting doubt concerning the determination and promptness of his actions.

Loss aversion

When the continuation of existence is at stake Darwin's principle of "*the survival of the fittest*," implies that loss counts heavier that gain.[86] We are more motivated by the thought of losing something than by the thought of gaining something of equal value.[87] Therefore, in order to persuade an opponent to choose a desired course of action, for example during negotiations, try to emphasise the losses that he may avoid, instead of focusing on possible gains. For example: a certain intervention may better be formulated as "*saving the lives of one's own people*" or "*saving unnecessary expenses*" than in terms of "*military strength*" or "*monetary gain*."

We are more motivated by the thought of losing something than by the thought of gaining something of equal value.

Scarcity

When resources, assets or opportunities become less available, we have to spend more effort to acquire them. In addition, the most desired items (because of their positive qualities) often become scarce.[88] Therefore, our ancestors developed a simple rule of thumb, which is: to attach more favour to scarce commodities. Using this heuristic on a political or strategic level, we can increase the perceived attractiveness of a certain good (e.g., a raw material) by suggesting that it is scarcer than it really is.[89] This may be done by pointing out similar interests of other (competing) parties or potential future supply problems.

Table 5. Examples utilising self-interest principles

Desired effects:
- Take advantage of, or create a favourable situation for tactical, operational, or strategic purposes (exploit).

Target audience:
- Local audiences, opponent leaders.

Utilising principles
- Portray an opponent leader as indecisive to provoke him to take (overly) hasty actions.
- Frame messages by emphasising the avoidance of losses.
- Increase the perceived attractiveness of goods or information by suggesting scarcity.
- Make smart use of reactance: get the audience to perform the desired actions by encouraging or asking them to do the opposite.
- Fake explicit or more concrete, what positive or negative possible results of certain actions really will mean to people and their future lives.
- Focus on the emotional and practical consequences instead of on underlying facts and processes.

Historic example:
- In early 2022, Ukraine launched a campaign targeting families of deployed Russian soldiers: 'Come back from Ukraine alive'. This hotline was acknowledged as both a humanitarian and propaganda tool by Ukrainian authorities themselves. It gave the opportunity for Russian soldiers' families to choose individual interest and survival (being reunited as a family) above the national interest displayed by Russia and justifying the conflict. In addition, the hotline provided a counter narrative to the Russian ones being played out at the beginning of the conflict.
- Some COVID-19 counter narratives have shown to actually have the opposite effects. Doctors spreading scientific knowledge online that contradicted conspiracy theories were not believed by the target audience. If anything, it dug a bigger gap and resistance.

86 Charles Darwin, *On the Origin of Species* (London: John Murray, 1859).

87 Daniel Kahneman and Amos Tversky, "Choices, Values, and Frames," *American Psychologist* 39, no. 4 (1984): 341–50, https://doi.org/10.1037/0003-066X.39.4.341.

88 Luigi Mittone and Lucia Savadori, "The Scarcity Bias," *Applied Psychology* 58, no. 3 (2009): 453–68, https://doi.org/10.1111/j.1464-0597.2009.00401.x.

89 Robert B Cialdini, *Influence: The Psychology of Persuasion* (HarperCollins, 1984).

3.2. Herd behaviour

3.2.1. Evolutionary mechanism

For their own sake humans have interest in the survival of their own group and on their own strong position within that group.[90, 91] *This means that they have to align their collective thinking and behaviour without centralised direction. This is accomplished by being kind and polite, moving along with the majority, copying other people's behaviour, being susceptible to status and authority, aversion to strangers, and paying back favours.*[92]

People always had an interest in belonging to well-functioning and strong groups. This corresponds to our tendency to conform our behaviour to the group in which we belong and to the leaders of that group. We are very sensitive to different forms of group pressure, and we aim to maintain or enhance our position within a collective. Most social evolutionary inclinations have already been described and advocated by Cialdini.[93] We thus easily adapt to people around us with which we feel connected, and we follow leaders in groups. This can lead, for example, to the blind copying of the behaviour of others and to the faithful following of persuasive and charismatic others. Social media make social groups virtual and independent of geographical location, thereby reconfiguring the network structure that influences behaviour. This can be very effectively used to capitalise on the dynamics of herd behaviour and substantially amplify their effects.[94]

We are very sensitive to different forms of group pressure, and we aim to maintain or enhance our position within a collective.

3.2.2. Utilising herd behaviour principles in interventions

Reciprocity

When someone gives you something for free or offers you a service, we tend to feel obligated to return the favour (Reciprocity). This widely shared feeling of future obligation made an enormous difference in human social evolution, because it meant that one person could give something to another with confidence that it would be returned (or not be in vain or lost). Using this principle, more support among the population in a mission area may be gained by providing, not only supportive information, but also food, transport, basic products, or other facilities that are valued by local people.

Social proof

What the 'right' thing is to do is always uncertain to the individual.[95] When other people were acting a certain way, it was for our ancestors usually a clue that this was probably a right thing to do.[96] This tendency to see an action as more appropriate when others are doing it (Social proof) and seeing it as an example to follow (Bandwagon effect), is simple and convenient,

90 Tooby and Cosmides, "Conceptual Foundations"

91 Raafat, Chater, and Frith, "Herding in Humans"

92 Korteling and Toet, "Cognitive Biases"

93 Cialdini, Influence

94 Nathan O. Hodas and Kristina Lerman, "The Simple Rules of Social Contagion," *Scientific Reports* 4, no. 4343 (2014), https://doi.org/10.1038/srep04343.

95 Hansen, Influence

96 Peter J. Richerson and Robert Boyd, *Not by Genes Alone: How Culture Transformed Human Evolution* (University of Chicago Press, 2006).

especially when a decision situation is uncertain or ambiguous.[97], [98] This herd tendency may be used to enhance disturbing inter-group sentiments in an opponent state, for example by focussing on, or distributing, negative information between different groups.[99], [100]

Authority

For our ancestors, obedience to (recognised) authorities helped them to maintain a good position in the group, and (thereby) helped them to survive. People tend to accept information provided by authority figures (formal as well as informal) as true and guiding without too much critical consideration.[101] Authority is closely related to the concept of 'credibility.' Credibility of a sender is considered to consist of two elements: expertise and trustworthiness.[102], [103] In general, credibility of a sender promotes influence. Based on a comprehensive literature review, it was concluded that the source credibility dimension offers the most easily accessible implications for influence operations, compared to all other aspects of the source.[104] Modern social media platforms such as Twitter, YouTube or discussion forums can greatly increase the reach and impact of both formal and informal authorities (e.g., influencers).

People tend to accept information provided by authority figures (formal as well as informal) as true and guiding without too much critical consideration.

Liking

As herd animals we tend to help, support, or comply with other people more as we sympathise with them (Liking). Sympathising is based on factors such as: physical attractiveness, familiarity/similarity, and kindliness. For example, senders who are seen to be more physically attractive are more likely to be persuasive. It has been demonstrated that attractive people are treated more cordially and are more successful in soliciting money from people for a charity goal.[105] We also tend to believe in charm, praise and flattery and we like those who provide it, even when it may likely be false. Familiarity is an important aspect here: our attitude toward something is influenced by the number of times we have been exposed to it in the past (e.g., the *mere exposure effect).*[106]

97 Tatsuya Kameda, Masanori Takezawa, and Reid Hastie, "The Logic of Social Sharing: An Evolutionary Game Analysis of Adaptive Norm Development," *Personality and Social Psychology Review* 7, no. 1 (2003): 2–19, https://doi.org/10.1207/S15327957PSPR0701_1.

98 Sara E. Gorman and Jack M. Gorman, *Denying to the Grave: Why We Ignore the Science That Will Save Us* (Oxford University Press, 2021).

99 Hadley Cantril, "Propaganda Analysis," *The English Journal* 27, no. 3 (1938): 217–21.

100 Paul F. Lazarsfeld and Robert K. Merton, "Mass Communications, Popular Taste, and Organized Social Action," in *The Communication of Ideas*, ed. L Bryson (New York: Harper, 1948).

101 Stanley Milgram, "Behavioral Study of Obedience," *The Journal of Abnormal and Social Psychology* 67, no. 4 (1963): 371–78, https://doi.org/10.1037/h0040525.

102 Chanthika Pornpitakpan, "The Persuasiveness of Source Credibility: A Critical Review of Five Decades Evidence," *Journal of Applied Social Psychology* 34, no. 2 (2004): 243–81, https://doi.org/10.1111/j.1559-1816.2004.tb02547.x.

103 Carl I. Hovland, Irving L. Janis, and Harold H. Kelley, *Communication and Persuasion: Psychological Studies of Opinion Change* (New Haven: Yale University Press, 1953).

104 Pornpitakpan, "The Persuasiveness of Source Credibility"

105 Peter H. Reingen and Jerome B. Kernan, "Social Perception and Interpersonal Influence: Some Consequences of the Physical Attractiveness Stereotype in a Personal Selling Setting," *Journal of Consumer Psychology* 2, no. 1 (1993): 25–38, https://doi.org/10.1016/S1057-7408(08)80073-3.

106 Robert B. Zajonc, "Attitudinal Effects of Mere Exposure," *Journal of Personality and Social Psychology* 9, no. 2 (1968): 1–27, http://dx.doi.org/10.1037/h0025848.

Table 6. Examples utilising herd behaviour principles

Desired effects:
– Maintain and increase support for specific ideas, actors, organisations, or activities (reinforce).

Target audience:
– Military units.
– Local population.

Utilising principles:
– Provide supportive information and other products and services valued by the audience.
– Show what similar people are doing in an ambiguous situation.
– Spread disinformation to opposing groups to amplify their intergroup disputes.
– Use formal and informal (online) influencers or celebrities (authorities).
– Emphasise or create similarities to enhance group cohesion.
– Use group symbols that emanate, or are related to, status, power, and respect.

Historic examples:
– As most Afghan men wear beards, the popular trend among Dutch units deployed in Afghanistan to wear full beards may have helped to break down cultural barriers between the Dutch Armed Forces and the Afghans (i.e., liking by similarity).
– In France, the development of Yellow Vest groups on Facebook in 2018/2019 has created a strong group dynamic. Movement members created Facebook groups and events, developed a network organisation, hierarchies and codes. The group dynamic was based on strong motivational values, such as defending each other's economic well-being. In these kinds of communities, participants quickly group around a newly built culture of unity. This unity is a motor for the movement.

Tasks involving probabilistic and logical reasoning typically require our full attention and we usually need a lot of time to execute them correctly and accurately.

3.3. Statistical blindness

3.3.1. Evolutionary mechanism

Humans have poor capacities for logical reasoning, calculation and a poor intuitive sense for coincidence, randomness, statistics, and probability reasoning.

In the primeval times, dangers and opportunities were clear and real. There was no evolutionary advantage in being able to make estimates based on available quantitative data. In line with this, ordinary people (as opposed to experts in a certain domain) have limited evolved cognitive capacities for calculus and logical reasoning and our intuitions for randomness, probability and statistics are poor. This has resulted in various tendencies to draw erroneous conclusions on the basis of poor probabilistic and logical reasoning. Tasks involving probabilistic and logical reasoning typically require our full attention and we usually need a lot of time to execute them correctly and accurately. Despite this fact, today we have to draw inferences and build conclusions from complex, incomplete, or inconsistent (often numerical and probabilistic) data. Most people do not sufficiently take this limitation into account and are easily misled by statistical or quantitative information.

3.3.2. Utilising statistical blindness principles in interventions

Neglect of probability

People focus on imaginable and highly loaded issues, while neglecting their probabilities.[107] We sometimes even tend to completely disregard probability when making a decision about uncertain issues that are emotionally charged with major consequences.[108] This allows a

107 Sunstein, Cass R, "Probability Neglect: Emotions, Worst Cases, and Law," *The Yale Law Journal* 112 (2002): 61–107.

108 Kahneman, Thinking, Fast and Slow

government to 'enforce' or legitimate many unwelcome, unpleasant, or even suppressing measures by highlighting for example the highly unlikely but horrible effects of foreign or terrorist attacks (e.g., in the media). In this way, they may authorise themselves with major competences or powers. This is often regarded as completely legitimate and evident despite the very low actual probability of individuals to become a victim of an attack.[109]

Neglect of the unimaginable

An opponent may be relatively blind to (or unaware of) actions or events that are (very) different from earlier ones or that are (very) unusual, unconventional or irregular.

The other side of our difficulty with low-probabilities is that we tend to under weigh the risks associated with unlikely-but-impactful events ('black swans').[110] This is especially so when it is *difficult* to imagine their occurrence and effects, which is for example the case when they have never happened before (normalcy bias). So, an opponent may be relatively blind to (or unaware of) actions or events that are (very) different from earlier ones or that are (very) unusual, unconventional or irregular.

Statistical regression (to the mean)

Because of noise, chance and random fluctuations, extreme data about an object will statistically tend to regress to a more average value through time, without any causal reason. Capitalise on this so called 'regression to the mean,' for instance by connecting false causes to predictions that simply follow from this statistical phenomenon. It is very surprising how often this phenomenon remains unnoticed, even in people with a scientific background.[111] For instance, a decrease in terror attacks after a new measure, which was taken in response to a series of rapidly successive attacks, is attributed by the public to this single measure rather than to the (statistically more plausible) effect of chance.

Table 7. Examples utilising statistical blindness principles

Desired effects:
- Legitimising strict authoritarian measures against own population or positive evaluation (and thus future support) of interventions.
- Legitimising strict authoritarian measures against own population for which the population is not prepared.

Target audience:
- One's own population.
- Opposing military or regimes.

Utilising principles:
- Focus on (the severe) consequences of certain risks instead of on the (very low) probabilities that individuals become victims.
- Create or heighten perceived danger posed by external threats.
- Polarise the population to see the world in terms of good versus evil and generating the population's desire for protection.
- To legitimise measures among the public, focus on a few striking aspects.
- Intervene in a process shortly after reaching an extreme state.
- Draw supportive conclusions based on small bodies (numbers) of consistent data, without bothering about effects of chance.

Historic example:
- Creating a statistically exaggerated fears of terrorist attacks among people in order to legitimise privacy violations by the government.
- Half-measures or ineffective measures taken shortly after a series of incidents can appear very effective based on the figures.

109 Duchateau-Polkerman, "Hoe Perceptie Ons Veiligheidsniveau Beïnvloedt"

110 Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, vol. 2 (Random House, 2007).

111 Kahneman, Thinking, Fast and Slow

4. Discussion

In this paper we provided a structured overview of psychological key principles, that may be employed to influence human (own, neutral, opposing) decision making in the information environment. This overview of principles followed from existing knowledge on human intuitive, or heuristic, (a)rationality as grounded in hard-wired neural and evolutionary mechanisms. This work connects neurosciences and psychology with behavioural influence practices in military operations. It should be noted that the possible complex relationships amongst psychological factors, military context, and behavioural effects are not yet well reflected in this paper. Additionally, it is important to note that the use and application of this knowledge should be accompanied by thorough audience analysis.[112] This is a major point that was deliberately only marginally addressed in this paper because of its extensive scope. Also, the link between analysis and interventions and how to use the principles and intervention ideas in military practice will have to be further developed. Questions in this connection are: What kinds or cultural factors (e.g., religious, historic, moral, political, etc.) form the most effective 'buttons' that may be applied for influence operations?[113] How do practitioners account for different contexts when applying interventions? What determines their effectiveness and how can we measure that? In general, the present theories and concepts for behavioural influence still do not go beyond the use of direct and straightforward effects of factors and principles that affect attitudes and behaviour. Finally, knowledge is still lacking in the field of effect analysis and measurement, as well as in the field of training and education on this topic.

It is important to note that the use and application of this knowledge should be accompanied by thorough audience analysis.

An important first step would be to transform existing knowledge of information intervention principles into a support tool. This tool should support the development and application of appropriate and effective information interventions, which involves their anticipation, selection, specification, construction, execution, and evaluation. In this connection, TNO is developing a framework (called *Battle of Perceptions framework*) for the construction of information activities and interventions.[114] Borrowing from communication theory,[115] the core construct of this framework is "Information intervention" (or "stratagem"). This is defined as: "*A military action/operation in the information environment intended to influence the thinking, feeling and behaviour of a (target) audience in order to obtain a goal".*[116] An information intervention can be subdivided into six essential components:

1. aimed to obtain a certain (well-defined) Goal (Goal)
2. carried out by the Military or an allied Source (or Sender)
3. aimed at a specific Audience (Receiver)
4. involves the deliberate manipulation or construction (fabrication, presentation, dissemination, concealment, distortion, destruction) of information (Message)
5. using one or more Media (Medium, Channel)
6. uses certain Tools and/or (enabling) Technologies (T&T).

112 Tom Powell et al., "Understanding the Information Environment: Military Needs, Factors, and Methods for Target Audience Analysis (V2226)" (TNO 2022 R12537, 2023).

113 Our fight against terrorism seems to have much more impact on our societies than the objective direct effects of terrorism itself. What elements of Western culture and societies generate this broad spectrum of antiterrorism measures that may destroy crucial forms of cooperation, privacy, and trust?

114 Tineke Hof et al., "Towards a Battle of Perceptions Framework for Information Activities. TNO 2023 R11010." (TNO Defence, Safety & Security, 2023).

115 Barbara D. Adams, Jessica Sartory, and Sonya Waldherr, "Military Influence Operations: Review of Relevant Scientific Literature" (Toronto: Defence Research and Development Canada, 2007).

116 Hof et al., "Towards a Battle of Perceptions Framework"

A tool that supports the construction of information activities can range between a simple structured checklist or a database containing examples at one hand, to a complex and interactive computer program endowed with AI-enhanced advice and prediction modules. Whatever its form could be, we envisage a tool that supports tactical and/or strategical experts in the design, development, and execution of effective information activities.

We are aware of the fact that information warfare still is a delicate subject that easily generates some understandable awkwardness or initial reservations among many people. This counts for non-professionals as well as for professionals (e.g., journalists), and it is seen inside as well as outside Defence organisations. Indeed, in the 'wrong' hands, knowledge on human cognition and decision making can be misused to manipulate or incite populations to distrust or harmful action.[117, 118] This study provides a foundation the military can use, for their justified reasons. This is similar to the application of many other advanced technologies like artificial intelligence models, weapons, robots, all kinds of ICT products, etc. The benefit or harm is not in the technology itself, but in the purpose and application for which it is used. So, information warfare as a *means* should not be confused with the repressive goals of for example dictatorial regimes. If we democratically choose to achieve certain goals, then it is arguable that governments use their instruments as effectively as possible to achieve those goals. If information weapons are used (instead of e.g., bombs, grenades) this may prevent much bloodshed. In addition, the principles of how to "nudge" people into certain behaviours still leaves people free to make their own decisions and to choose their own path and goals.

Such kinds of offensive campaigns would not be in line with the foundations and basic ethical principles of democracy and the rule of law.

Our preferred way of influencing in information warfare is not about spreading disinformation, untruths, and blunt lies. Neither about disinformation campaigns with thousands of bots targeting social, institutional, and political trust aimed to undermine and disrupt the stability and basis of our Western democracies. Such kinds of offensive campaigns would not be in line with the foundations and basic ethical principles of democracy and the rule of law.

From this moral point of view, it should also be noted that the deliberate application of neuroscience and psychology to steer the thinking, judgement, and decision-making judgments of people is common practice in the domains of politics and commerce[119] and neuro-marketing.[120] This art of deliberate influence may sometimes be brutal, openly, and explicit but more often (aided by AI algorithms) subtle and targeted in a very sophisticated and nuanced way. In this regard the internet is populated by multi-nationals who select and channel the information we receive according to their commercial business models. From our perspective it may also be argued that the underlying motives in these areas may be considered less beneficial for humanity than those of our defence forces.

Information plays today and more than ever a substantial role in our society and democracy and in the battlefield. Maintaining and controlling the narrative is a necessity. It requires authorities to shape their message in an effective way to counter offensive interventions from enemies as much as to build resilience among one society's own local population. The relatively less blunt nature of our information interventions makes them ethically acceptable and (with that) also less susceptible to backfire. The present paper only showed some examples

117 Luc Bovens, "The Ethics of Nudge," in *Preference Change: Approaches from Philosophy, Economics and Psychology*, ed. Till Grüne-Yanoff and Sven Ove Hansson (Dordrecht: Springer Science, 2009), 207–20.

118 Nichola J Raihani, "Nudge Politics: Efficacy and Ethics," *Frontiers in Psychology* 4 (2013), https://doi.org/10.3389/fpsyg.2013.00972.

119 Cialdini, Influence

120 R. Mark Wilson, Jeannie Gaines, and Ronald Paul Hill, "Neuromarketing and Consumer Free Will," *Journal of Consumer Affairs* 42, no. 3 (2008): 389–410, https://doi.org/10.1111/j.1745-6606.2008.00114.x.

of the principles that can be used to construct information interventions. Understanding and further extension and operationalisation of the principles and concepts, even more so in a digitalised world, will substantially enhance military information warfare capabilities. This is so because the hard-wired and ingrained character of bias-based interventions makes them very difficult to ignore, mitigate or battle. They will still work even when you know that you are being influenced. We hope that this article has shown that neuroevolutionary insights into human cognition can help information warfare to become increasingly decisive in the geopolitical and military arena of the future.

This article has shown that neuroevolutionary insights into human cognition can help information warfare to become increasingly decisive in the geopolitical and military arena of the future.

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Dr **Hans Korteling** received B.Sc. degrees in Law and Philosophy and a M.Sc. degree (*cum laude*) in Psychology (Psychophysiology) at the University of Amsterdam. At present, Hans is working as a senior Human Factors expert and integrator at the Human Behaviour and Training department, where his primary scientific interests include cognitive biases in human decision making, psychological influence in cognitive warfare, and human-AI interaction.

The Hague Centre
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HCSS
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