Cognition 141 (2015) 36–40

Contents lists available at ScienceDirect

Cognition

journal homepage: www.elsevier.com/locate/COGNIT

Brief article

Risk taking in adversarial situations: Civilization differences in chess experts

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ARTICLE INFO

Article history:
Received 2 November 2010
Revised 1 April 2015
Accepted 2 April 2015
Available online 24 April 2015

Keywords:
Civilization
Decision making
Expertise
Politics
Risk taking
Strategy

ABSTRACT

The projections of experts in politics predict that a new world order will emerge within two decades. Being multipolar, this world will inevitably lead to frictions where civilizations and states will have to decide whether to risk conflict. Very often these decisions are informed if not taken by experts. To estimate risk-taking across civilizations, we examined strategies used in 667,599 chess games played over eleven years by chess experts from 11 different civilizations. We show that some civilizations are more inclined to settle for peace. Similarly, we show that once engaged in the battle, the level of risk taking varies significantly across civilizations, the boldest civilization using the riskiest strategy about 35% more than the most conservative civilization. We discuss which psychological factors might underpin these civilizational differences.

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1. Introduction

Two reports from the National Intelligence Council (Fingar, 2008; Kojtn, 2012) and a report from the European Union (Team, 2010) describe the political dynamics underpinning the social, economic, and cultural changes taking place on a global scale. All three reports come to the conclusion that within the next 10–15 years, the list of countries exerting power over the planet will change, thus setting a new political and economic equilibrium. Since it is the nature of states to secure as many resources as possible and to limit other states' zones of influence (Kissinger, 1995), it is reasonable to predict divergent interests. Although history has taught states the benefits of resolving problems through cooperation, there will be situations in which confrontations are inevitable. The new dominating countries will express divergent interests that will occasionally crystallize as crises (Lebow, 1981).

In an era where the leading countries have nuclear power, it is crucial to understand the roots of inappropriate risk-taking. Research in social and cognitive psychology has documented significant cultural differences in risk perception (Weber & Hsee, 1998) and risk-taking (Hsee & Weber, 1999). In the context of a new world order, a study examining differences in risk-taking on a planetary scale will indicate potential sources of conflict. In what follows, we demonstrate how studying expertise in cross-cultural settings leads to a better understanding of several crucial issues including (a) whether experts from different cultures are equally willing to start a conflict, and (b) whether experts from different cultures display different levels of propensity to risk whilst engaging in conflict.

That states compete to increase their power is a known fact, theorized many centuries ago (Machiavelli, 1532/2004). At any given moment, the political dynamics create a condition of equilibrium, responsive to perturbations.

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http://dx.doi.org/10.1016/j.cognition.2015.04.008
0010-0277/© 2015 Published by Elsevier B.V.

Significant tensions between states emerge when a state is willing to change the equilibrium (Jervis, 1976). How an international crisis develops has been discussed by Lebow (1981). Lebow distinguishes three types of crisis, each of which reflects a different attitude to engaging in armed conflict. In the first case called "hostility", the crisis is the result of frank, direct aggression. This type of crisis reflects a state's will to attack taking all risks to engage in battle. The second kind of crisis, termed "spinoff", refers to a third party's involvement in an ongoing crisis. The last type of crisis, termed "brinkmanship", refers to cases where bluff is used by one state to put pressure on another. If both states are willing to settle down, then peace should be agreed without conflict. The aggressor will acquire minimal gain and the victim will endure minimal loss. These three strategies characterize how a state can deal with a crisis.

Our understanding of political crises would dramatically improve if we could discover the differences in risk tolerance between civilizations[1]. Which strategy a state adopts depends upon how the situation is framed in terms of benefits and losses. In an especially insightful application of prospect theory (Tversky & Kahneman, 1992), McDermott (1998) demonstrates that deciders facing complex, adversarial situations essentially frame the whole situation as being globally positive or negative. When the situation is positive, individuals making economic decisions tend to be risk-avoidant in order to keep the benefits. However, when the situation is considered negative, individuals adopt a loss aversion attitude and engage in risk-taking behaviours (Kahneman & Tversky, 1984). McDermott (1998) shows that world leaders follow a similar pattern of behaviour when making political decisions. In parallel, cross-cultural differences in risk-taking have been extensively documented (Ali, 1993; Li, Bi, & Zhang, 2009; Ortwin & Rohrmann, 2000; Tse, Lee, Vertinsky, & Wehrung, 1988). These differences are rooted in cultural values (Douglas & Wildavsky, 1982). Values frame the situation, ultimately impacting upon the individual's perception of the situation as globally in the region of gains or losses. Since different cultures hold different values (Schwartz, 2004), we predict that perceptions of an adversarial situation will vary between cultures and thus risk-taking attitudes will also differ.

Following this reasoning, we make two predictions. First, in the case of conflict, civilizations will take different levels of strategic risk. Second, the willingness to engage in direct confrontation changes across civilizations, causing some civilizations to take a more peaceful approach.

Any empirical study aiming to test risk-taking on a planetary scale faces considerable methodological challenges. First, the domain should include situations of conflict with real-world consequences for the parties involved. Second, for the comparison of risk-taking to be valid, the same options should be available (e.g., avoiding conflict or fighting). Third, the measure of expertise should be valid across all countries, so that variations between civilizations cannot be accounted for by differences in training and experience. Fourth, the domain of study should allow the collection of data worldwide. We used chess as the domain as it meets all of these requirements. Chess is played with the same rules worldwide, which ensures that the same strategic options are available to all players. The ranking system in chess is valid internationally, ensuring that comparisons of expertise levels between countries or continents are not biased (Elo, 1978). Finally, competitive games played in tournaments have been compiled in databases that are available to researchers.

[1] In this paper, we use the term "civilization" to refer to a group of states sharing similar values.

2. Method

2.1. World segmentation

As indicated above, several studies have documented that cultural differences in risk-taking might reflect cultural differences in values. In line with this result, and as a proxy for civilizations, we used Huntington's (1996) segmentation of the planet according to cultural values: African, Buddhist, Ethiopian, Hindu, Japanese, Jewish, Latin, Muslim, Orthodox, Chinese, and Western. For a similar approach empirically implementing Huntington's concept of civilization, see Charron (2010) and Chiozza (2002). The civilizations were chosen according to map 1.3 (pp. 26–27) in Huntington (1996) and the surrounding text. In cases where states are home to more than one civilization, we selected the dominant civilization by using the information (mostly about religion) provided by CIA's World Factbook (https://www.cia.gov/library/publications/the-world-factbook/). We used the nine civilizations reported as such in Huntington (1996), plus two isolated countries, Israel and Ethiopia, about which the book's description is ambivalent.

2.2. Measure of risk

As is customary (Damodaran, 2007), we defined risk as the standard deviation (σ) around the expected value (μ). Based on the extensive chess literature, one can categorize openings in 3 main groups: (a) Pawn to King 4 (1.e4), (b) Pawn to Queen 4 (1.d4), and (c) other first moves (Matanović, Molorović, & Božić, 1971). We used the Fritz and a complement Big database 2010 (Morsch, 2009; hereafter, Fritz database). Fritz database contains 1,546,292 complete games played between 1625 and 2009. The analysis of the pattern of wins, draws and losses shows that σ was 41.45%, 40.02%, and 40.64%, for 1.e4, 1.d4, and the other first moves, respectively. As predicted, the three types of openings involved a different degree of risk, $F(2, 1{,}546{,}289) = 1004.81$, $p < 10^{-280}$. We can therefore call these three classes of openings "risky", "conservative", and "mixed".

2.3. Games and procedure

To examine civilization differences in risk-taking and engagement in conflict, we selected recent games to reflect the distribution of cultural values over the planet. We

extracted all the games from expert players (Elo $\geqslant$ 2000) over an eleven-year period (1999–2009; $N = 705{,}918$ entries). Incomplete records were excluded, yielding a final sample of $N = 667{,}599$ games. Limiting our analysis to experts ensures that the selected individuals have the skill necessary to meaningfully adopt a risk strategy. After selecting the games, we downloaded players' personal data from the October 2008 rating list of the International Chess Federation site (www.fide.com). Combining the information extracted from the game and affiliation databases allowed us to establish country of affiliation for each player, and thus to allocate each player to a civilization. To ensure statistical power, only civilizations with more than 1000 games were retained. This procedure led to the exclusions of games from the Ethiopian ($N = 19$) and Japanese ($N = 295$) civilizations. Strategic choice was then determined by considering the first move in each game. Note that there was no age difference between the civilizations for any of the three types of strategy: risky strategies, $F(1,9) = 1.05$, $p = .33$, $MSE < 0.01$, conservative strategies, $F(1,9) = .47$, $p = .51$, MSE < 0.01 and mixed strategies, $F(1,9) = 1.39$, $p = .27$, $MSE < 0.01$.

2.4. Organization of results

As mentioned above, Lebow (1981) distinguishes three different types of crisis: spinoff, brinkmanship, and open aggression. Open aggression constitutes the normal situation in chess and is the focus of this study. While spinoff and brinkmanship do not have direct parallels in chess, another behaviour is of considerable interest with respect to risk: agreeing on a draw early on in the game without any real fight, a behaviour called "grandmaster draw". In line with these considerations, the results are divided into two sections. In the first section, we will focus on cultural differences in risk-taking during open aggression. In the second section, we analyze civilization differences in avoiding conflict.

3. Results

3.1. Open aggression

Table 1 reports the number of observations as a function of civilization and strategy. A striking result is that some civilizations have many more observations than others. Statistical analysis shows that civilizations make different use of strategies, $\chi^2(16, N = 667{,}285) = 2261.92$, $p < .001$. Following this analysis, we present the variations across civilizations. Fig. 1 shows the proportion of risky, conservative and mixed strategies for each civilization, with the civilizations being sorted by increasing level of risk.

Players from the Jewish civilization are the only predominantly risk-avoidant players, with a usage proportion of the conservative strategy superior to 50% and a lower use of risk-taking strategies (42.21%). Players from the Chinese and Orthodox civilizations are not predominantly risk-seeking, as indicated by a proportion of use inferior to 50%, and use conservative and mixed strategies. All other civilizations predominantly use the risky strategy, showing that experts preferentially adopt a risk-taking strategy in adversarial situations. The civilization displaying the bolder approach to risk is the Buddhist civilization, with 56.94% of games using the risky strategy. Hence, the percentage difference (14.73%) between the Buddhist and Jewish civilizations indicates that the Buddhist civilization uses risk-taking strategies almost 35% ((56.94–42.21)/42.21) more than the Jewish civilization. It is worth noting that since civilizations make different use of mixed strategies, the use of conservative strategies does not mirror the use of risky strategies.

3.2. Avoiding conflict

This section examines the differences in agreements of early draws (before move 15) between experts of the same class over the whole year 2009. A highly-ranked player agreeing a draw with a much weaker opponent would lose a significant number of Elo points. Hence, early draws are usually agreed by players of equal level. We distinguished between four classes of players: *Experts* (2000–2199 Elo), *Masters* (2200–2399 Elo), *International* players (2400–2599 Elo), and *World* class players (2600–2799 Elo). We analyzed the games where both players belonged to the same class.

Fig. 2 shows that the proportion of early draws never reaches 10%. This proportion differs significantly among civilizations, $\chi^2(8, N = 43{,}601) = 101.62$, $p < .01$. While some civilizations are absolutely reluctant to choose the diplomatic output (i.e., *Buddhist*), others concede a rapid draw in about one game out of twelve (i.e., *Orthodox*). Analyzing the data across skill levels reveals civilization differences in conflict avoidance at all levels except

Table 1
Number of observations for all civilizations ($N = 667{,}285$ games).

	Risky	Conservative	Mixed	TOTAL
Western	186,194 (50.75%)	140,411 (38.27%)	40,260 (10.97%)	366,865
Latin	21,091 (54.58%)	13,527 (35.01%)	4025 (10.42%)	38,643
African	676 (52.69%)	477 (37.18%)	130 (10.13%)	1283
Muslim	15,008 (52.94%)	10,818 (38.16%)	2521 (08.89%)	28,347
Chinese	5849 (46.02%)	5686 (44.73%)	1176 (09.25%)	12,711
Hindu	9331 (54.57%)	6,296 (36.82%)	1471 (08.60%)	17,098
Orthodox	91,363 (47.76%)	81,289 (42.49%)	18,649 (09.75%)	191,301
Buddhist	1173 (56.94%)	775 (37.62%)	112 (05.44%)	2060
Jewish	3789 (42.21%)	4477 (49.87%)	711 (07.92%)	8977

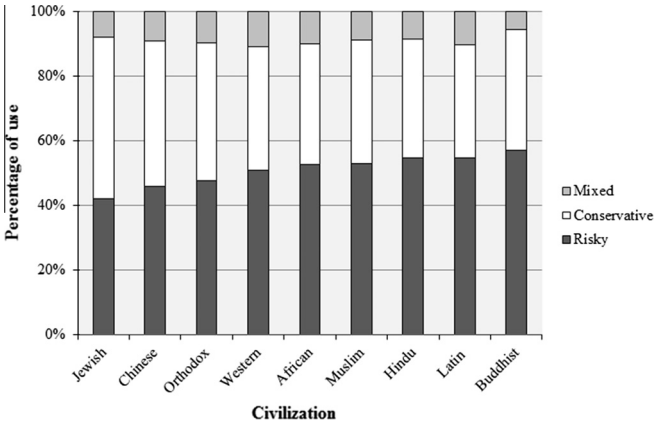

Fig. 1. Proportion of risky, conservative and mixed strategies as a function of civilizations.

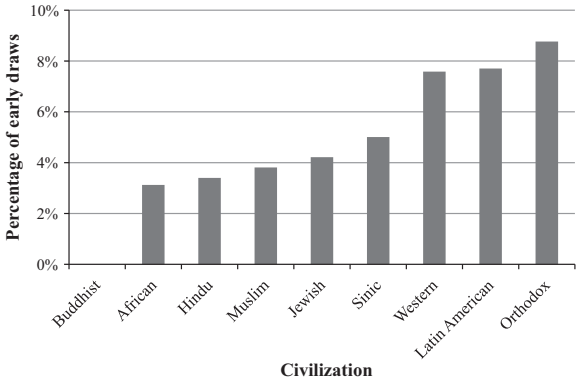

Fig. 2. Percentage of games played that ended in a draw before move 15 as a function of civilization.

world-class, where players of all civilizations make the same use of rapid draws: *Experts,* $\chi^2(8, N = 13{,}433) = 38.11$, $p < .01$; *Masters,* $\chi^2(8, N = 14{,}164) = 46.94$, $p < .01$; *International,* $\chi^2(8, N = 12{,}618) = 57.66$, $p < .01$; and *World,* $\chi^2(6, N = 3386) = 5.98$, $p = .43$. World-class players are the only players not demonstrating any civilization differences in reluctance to engage in battle.

4. Discussion

This study aimed to reveal cross-civilization differences on a planetary scale. The results have supported our two hypotheses: First, experts in different civilizations take different levels of strategic risk; and second, experts in different civilizations display different levels of willingness to engage in a conflict. Taken together, these results shed new light on the influence of values on risk-taking.

Our results reveal that experts in different civilizations take different levels of risk when facing a situation characterized by a high level of uncertainty. The extreme cases illustrate the differences: Buddhist experts used the riskiest strategy nearly 35% more than Jewish experts. Considering that the starting position in chess is always the same and that all players in this study were experts, we would speculate, in line with McDermott's (1998) approach, that the decision of taking a risky or conservative approach rests upon the initial framing of the situation. Within this theoretical approach, the fact that players take high levels of risk when playing White indicates their perception of the situation as globally negative. This conclusion comes in stark contrast with chess theory which predicts an advantage for the player having White (Mednis, 1982). An explanation of this discrepancy is that gains are not perceived to counterbalance potential losses. Due to the fact that losses loom larger than gains (Kahneman & Tversky, 1984), situations where the outcome can be positive or negative usually lead to risk-seeking attitudes. Yet, the level of risk taken varies significantly across civilizations, indicating that other variables modulate the framing of the initial position.

A key variable influencing framing concerns the values that civilizations hold. Values have been demonstrated to influence the perception of risk (Hsee & Weber, 1999). Some civilizations might reward risk-taking more than others. From this perspective, it is not the perception of risk that differs but the level of risk tolerance. A second variable of relevance is the will to change the status quo (Jervis, 1976). Cultural values in some civilizations might reward engagement in battle (Fox, 2004). Players' intentions are thus also crucial to risk-taking. Many conflicts have arisen due to misread intentions. For example, in 1914, Germany did not read the allies' intentions properly, which contributed crucially to the spiral of events that eventually led to the First World War (Lebow, 1981). Considering the evolution of international tensions, a misreading could lead to dramatic consequences. For example, a recent analysis has suggested that the perception of China as very assertive may stem from the media and as such does not have a clear ground (Johnston, 2013). Such a misreading of China's attitude may lead decision makers in other countries to erroneously frame their relationship with China and thus take unnecessary risks. Further research will have to investigate which cultural values modulate the risk tolerance to engage in a conflict.

In line with differences in strategy choice, the results on early draws have also highlighted key differences across

civilizations. Usually, fewer than 10% of games lead to a quick draw. While this result seems to indicate a low proportion of agreed draws, its impact is very high. In a board game where confrontation is the very essence, some players prefer to avoid it. This peaceful attitude comes at minimal cost or minimal gain. It is difficult at this stage to uncover the mechanisms that cause some civilizations to avoid conflict more than others. A speculative argument is that some civilizations might avoid conflict to save energy. Considering that tournaments typically last several days, it is wise to manage one's energy. When the opponent is basically of the same level, the battle may last for a long time while the likelihood of winning is not high. The trade-off between high uncertainty and a modest reward can be perceived differently in different civilizations, leading some civilizations to agree more often to early draws.

Our study has limitations. First, Huntington's (1996) classification of civilizations, as any simple classification claiming to account for the complexity and diversity of cultures and civilizations, is not perfect. Second, only one kind of game was used, which limits its degree of generalization. Finally, the nature of the costs incurred by chess players might not representative of costs in other situations. Although rating points impact upon a chess player's career and income, they are a resource that can be replenished. In comparison, confrontations leading to physical damage might lead to the framing of such situations differing substantially from the framing of situations involving non-physical damage. Future research should look into the civilization differences in risk-taking for physical damage.

Our results shed an unprecedented light on civilization differences in risk-taking across the globe and thus offer a worldwide profile of risk attitude. Although not predictive for specific individuals, they highlight tendencies that can be used to inform decisions.

Acknowledgment

We thank anonymous reviewers for useful comments. We also thank Neil Charness for insightful comments on this article.

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