

This is the final published version of:

Chater, N., Johansson, P., & Hall, L. (2011). The non-existence of risk attitude. *Frontiers in psychology*, 2, 303. doi:10.3389/fpsyg.2011.00303

Opening Paragraph: Where do risk preferences come from? How do we decide if it is safe to eat unpasteurized cheese, whether to take up paragliding or mini-golf as a new hobby, whether to save in government bonds or place our money in a new technology hedge fund? Asking about the origin of risk preference in this general form requires two presuppositions, both of which may be challenged. The first presupposition is that there is some *unitary* basis to decisions about risk, where the nature of such risks (whether food poisoning, instant death, social embarrassment, or financial disaster) may vary substantially. The second presupposition is this unitary basis determines *stable* risk preferences, which help determining our choices when faced with risk

Keywords: Choice Blindness, Decision Making, Risk Attitude, Risk Preferences, Introspection, Self-Knowledge, Confabulation,

For an overview of our choice blindness research, and access to our publications, please see our lab page at:

<http://www.lucs.lu.se/choice-blindness-group/>



The non-existence of risk attitude

Nick Chater¹, Petter Johansson^{2*} and Lars Hall³

¹ Behavioural Science Group, Warwick Business School, University of Warwick, Warwick, UK

² Division of Psychology and Language Sciences, University College London, London, UK

³ Lund University Cognitive Science, Lund University, Lund, Sweden

*Correspondence: petter.johansson@lucs.lu.se

Where do risk preferences come from? How do we decide if it is safe to eat unpasteurized cheese, whether to take up paragliding or mini-golf as a new hobby, whether to save in government bonds or place our money in a new technology hedge fund?

Asking about the origin of risk preference in this general form requires two presuppositions, both of which may be challenged. The first presupposition is that there is some *unitary* basis to decisions about risk, where the nature of such risks (whether food poisoning, instant death, social embarrassment, or financial disaster) may vary substantially. The second presupposition is this unitary basis determines *stable* risk preferences, which help determining our choices when faced with risk.

Regarding the first issue, Slovic (1987) has argued persuasively that there are many dimensions to the perception of risk (e.g., level of knowledge, feeling of control, novelty), and that each dimensions influences decision-making differently. Moreover, many studies have shown that the superficial characteristics of the same underlying risk (e.g., whether that risk is framed as a gamble, investment, or insurance problem) leads to wildly varying, and fairly uncorrelated, choices (Vlaev et al., 2010). Results such as these raise the possibility that the process of psychological or emotional risk-taking is divided into a multitude of different mechanisms.

Regarding the second issue, again a wide variety of studies indicate that people's risky choices are enormously flexible, not merely because of the types of framing manipulation mentioned above, but in virtue of the range of choice options presented. It is well known, for example, that people are much more likely to choose an option that is presented as a default (Johnson and Goldstein, 2003). Moreover, people's risk preferences can be radically shifted by changing the range of options available. One powerful illustration of this, prospect relativity, has been found with conventional risky gambles

(Stewart et al., 2003), in which people are happy to choose, say, a low-to-middle option in a range of low-risk-low-return alternatives, while simultaneously preferring a low-to-middle option in a completely non-overlapping range of high-risk-high-return options. Thus, people will happily generate completely inconsistent choices concerning preferences of their optimal balance between risk and return, and may, indeed, give such contradictory choices within a few minutes, in a single experimental session.

One approach to these concerns is to try to build a highly multifaceted and flexible account of risk preference. We suggest pursuing an alternative strategy: to aim to explain how people make decisions, including decisions about risk, without drawing on any underlying psychological notion of risk attitude at all.

Suppose, for example, that people make decisions about whether to eat unpasteurized cheese, to paraglide, or invest in a hedge fund, simply by copying past behaviors. For example, if everybody eats unpasteurized cheese in my community, I will probably eat it too. If all my friends invest in hedge funds, it is likely that I will do it too. There has been an enormous amount of research from neuroscience to social science, and across a wide range of species, which suggests that imitative behavior is widespread across the biological and social world (e.g., Whiten et al., 2004; Boyd and Richerson, 2005; Hurley and Chater, 2005; Raafat et al., 2009).

Note too, that we also seek to copy our own past behavior. Thus, if I usually play the lottery, I will probably play it again this week; if I have skied many years, I am likely to continue. A particularly vivid illustration of the degree to which our current choices are shaped by our own previous behavior is given by the phenomenon of *choice blindness* (Johansson et al., 2005). In a typical choice blindness task, people asked to choose which of two options they prefer; they are then given what they believe to be

their chosen alternative and asked to justify their selection. Crucially, on a minority of trials a conjuring trick is used to present people with the non-selected option. Typically people do not notice that they have been given the "wrong" option; moreover, they are also able to offer elaborate reasons for the choice they now believe they had made. These verbal reports have been analyzed on a number of different dimensions, such as the level of effort, emotionality, specificity, and certainty expressed, but no substantial differences between manipulated and non-manipulated reports was found (Johansson et al., 2005, 2006). The lack of differentiation between reasons given for an actual and a manipulated choice is further evidence that there may be an element of confabulation in "truthful" reporting as well. In addition to attractiveness choices for faces and abstract patterns (Johansson et al., 2008), choice blindness has been demonstrated for taste and smell (Hall et al., 2010), and even for moral judgments involving hotly debated topics in the current political debate (Hall et al., submitted).

From the point of view of the present discussion, there is also recent evidence that this type of manipulation affects people's future choices and evaluations. In a new version of the original choice blindness experiment, the participants had to choose between the same pairs of faces a second time, as well as separately rate all the faces at the end of the experiment. This procedure revealed that the manipulation induced a pronounced (but to the participants unknown) preference change, as they came to prefer the originally non-preferred face in subsequent choices, as well as rate the face they were led to believe they liked higher than the one they thought they rejected (Hall et al., in preparation). Similarly, but more dramatically, it has been shown that that choice blindness can strongly influence voting intentions just a week before a national election (Hall et al., in preparation).

Even more pertinent to the theme of this special issue is an ongoing study using false feedback in choices between probabilistic and sure outcomes (Kusev et al., in preparation), in which it was found that not only do the participants fail to notice manipulations of what level of risk they are willing to accept, but they also change their overall risk preferences for repeated choice scenarios, and in some conditions even show a complete preference reversal for the probability levels¹. Asymmetries and preference reversals for risk has been demonstrated before (see Lichtenstein and Slovic, 1971, 2006), but this is the first time it has been shown to be a consequence of a manipulation of prior choices, thus adding to the accumulated evidence that people do in fact *not* have stable preferences for risk. If they had, it seems unlikely that they would both accept a reversal of their risky choices, and, crucially, adjust their subsequent choices in line with the manipulations made.

To the degree that our current behavior is driven by past behavior (including our verbal explanations of that behavior), whether our own or other people's, then behavior may be shaped with no direct reference to risk attitudes. Note, of course, that the determinants of our current behavior include much more than mere copying. Indeed, while it is possible that some imitative behaviors and habits may involve the replication of behavior with relatively little cognitive engagement (e.g., Dijksterhuis et al., 2000), there are also many cases where the impact of past behavior is mediated by an attempt on the part of the decision-maker to provide a coherent explanation of his or her previous choices. This will not, in general, involve mere copying; indeed, the idea that we influence ourselves through the actions we take and the choices we make has a long history in psychology, with Festinger's *cognitive dissonance* (Festinger, 1957) and Bem's (1967) *self-perception theory* as the two classic theoretical rivals vying for domi-

nance as an explanation for the effect. But it also has some notable contemporaries, like Dan Ariely with his *coherent arbitrariness* model. Work by Ariely et al. (2003, 2006) strongly suggests that arbitrary and irrelevant factors cannot only influence participants in their assessment of the utility of different goods (such as when rumination on the digits of their social security number leads participants to create wildly different anchors for how much they are willing to pay a bottle of wine), but that these factors can be maintained through longer decision trajectories, creating a form of "coherent arbitrariness" (i.e., stable market patterns of revealed preferences; Ariely, 2008). In the words of Ariely and Norton: "These results demonstrate a kind of 'self-herding', in which people observe their past behavior, infer some amount of utility and act in accordance with the inference of utility, despite the fact that this behavior can be based not on the initial choice driven by hedonic utility but on any host of trivial situational factors that impacted the first decision" (Ariely and Norton, 2008, p.14).

From this perspective, though, to the degree that people's choices are consistent, such consistency will be enforced only where direct comparison between domains is possible. And we know from research on analogical reasoning that comparisons between domains is only possible when they are highly similar at the superficial level; "deep" links between problems with different superficial characteristics are rarely recognized (Cheng and Holyoak, 1985; Chater and Vlaev, 2011). This suggests that we might expect people to be relatively consistent with regards to whether they eat, or do not eat, different varieties of unpasteurized cheese; or whether they feel it safe to engage in different types of winter sports; but we would not expect any coherence across different risk domains. Similarly, narrowing to financial risk, we might expect people to be able to naturally relate to different types of insurance product, and hence, for example, have a general tendency to insure, or not to insure, their valuables. We would not expect people to be able to make comparisons between their insurance choices and their choices concerning whether to participate in lotteries, or to invest in hedge funds. And, indeed, behavior does seem to be entirely incoherent across different

financial domains, at least in experimental contexts (Kusev et al., 2009; Vlaev et al., 2010).

To summarize, the viewpoint that we have developed here has close relationships with the idea of "constructed preferences" described by Slovic (1995), i.e., the idea that people do not necessarily choose by tapping into previously established preferences (whether preferences concerning risk, or any other dimension); but that they create their preferences, on-the-fly, during the decision-making process. The present perspective pushes this line of thinking slightly further: rather than viewing people as constructing risk preferences, we suggest that the decision-making process is best explained without making reference to risk preferences at any stage. People's risky choices are shaped directly by past choices or explanations of those choices, by themselves and others; and any coherence between choices will typically be limited to choices which share superficial features, where people can directly compare their present with their past.

ACKNOWLEDGMENTS

We thank two anonymous reviewers for their helpful comments. Petter Johansson was supported by a Marie Curie postdoc fellowship, and Lars Hall by the Swedish Research Council.

REFERENCES

- Ariely, D. (2008). *Predictably Irrational*. New York, NY: Harper Collins.
- Ariely, D., Loewenstein, G., and Prelec, D. (2003). "Coherent arbitrariness": stable demand curves without stable preferences. *Q. J. Econ.* 118, 73–105.
- Ariely, D., Loewenstein, G., and Prelec, D. (2006). Tom Sawyer and the construction of value. *J. Econ. Behav. Organ.* 60, 1–10.
- Ariely, D., and Norton, M. I. (2008). How actions create – not just reveal – preferences. *Trends Cogn. Sci. (Regul. Ed.)* 12, 13–16.
- Bem, D. J. (1967). Self-perception: an alternative interpretation of cognitive dissonance phenomena. *Psychol. Rev.* 74, 183–200.
- Boyd, R., and Richerson, P. J. (2005). *The Origin and Evolution of Cultures*. New York: Oxford University Press.
- Chater, N., and Vlaev, I. (2011). "The instability of value," in *Decision Making: Attention and Performance XXIII* eds M. Delgado, E. A. Phelps, and T. W. Robbins (Oxford: Oxford University Press), 81–100.
- Cheng, P. W., and Holyoak, K. J. (1985). Pragmatic reasoning schemas. *Cogn. Psychol.* 17, 391–416.
- Dijksterhuis, A., Bargh, J. A., and Miedema, J. (2000). "Of men and mackerels: Attention and automatic behavior," in *Subjective Experience in Social Cognition and Behavior*, eds H. Bless and J. P. Forgas (Philadelphia: Psychology Press), 36–51.

¹Kusev et al. (in preparation) also contains a series of experiments exploring other aspects of risky choice, showing that not only feedback but also context, task demands, and assimilation of perceptual information influence peoples' risky choices. The ambition of Kusev et al. (in preparation) is to create a comprehensive theory of risky choice, but in the current paper we have narrowed our focus to the role of self-feedback as a factor in the formation of preferences for risk.

- Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.
- Hall, L., Johansson, P., Tärning, B., Sikström, S., and Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition* 117, 54–61.
- Hurley, S., and Chater, N. (eds). (2005). *Perspectives on Imitation: From Neuroscience to Social Science, 2 Volume-Set. Volume 1. Mechanisms of Imitation and Imitation in Animals. Volume 2: Imitation, Human Development and Culture*. Cambridge, MA: MIT Press.
- Johansson, P., Hall, L., and Sikström, S. (2008). From change blindness to choice blindness. *Psychologia* 51, 142–155.
- Johansson, P., Hall, L., Sikström, S., and Olsson, A. (2005). Failure to detect mismatches between intention and outcome in a simple decision task. *Science* 310, 116–119.
- Johansson, P., Hall, L., Sikström, S., Tärning, B., and Lind, A. (2006). How something can be said about telling more than we can know: on choice blindness and introspection. *Conscious. Cogn.* 15, 673–692.
- Johnson, E. J., and Goldstein, D. G. (2003). Do defaults save lives? *Science* 302, 1338–1339.
- Kusev, P., van Schaik, P., Ayton, P., Dent, J., and Chater, N. (2009). Exaggerated risk: prospect theory and probability weighting in risky choice. *J. Exp. Psychol. Learn. Mem. Cogn.* 35, 1487–1505.
- Lichtenstein, S., and Slovic, P. (1971). Reversals of preference between bids and choices in gambling decisions. *J. Exp. Psychol.* 89, 46–55.
- Lichtenstein, S., and Slovic, P. (2006). *The Construction of Preference: An overview. The Construction of Preference*. New York, NY: Cambridge University Press, 1–40.
- Raafat, R., Chater, N., and Frith, C. (2009). Herding in humans. *Trends Cogn. Sci. (Regul. Ed.)* 13, 420–428.
- Slovic, P. (1987). Perception of risk. *Science* 236, 280–285.
- Slovic, P. (1995). The construction of preference. *Am. Psychol.* 50, 364–371.
- Stewart, N., Chater, N., Stott, H. P., and Reimers, S. (2003). Prospect relativity: how choice options influence decision under risk. *J. Exp. Psychol. Gen.* 132, 23–46.
- Vlaev, I., Kusev, P., Stewart, N., Aldrovandi, S., and Chater, N. (2010). Domain effects and financial risk attitudes. *Risk Anal.* 30, 1374–1386.
- Whiten, A., Horner, V., Litchfield, C. A., and Marshall-Pescini, S. (2004). How do apes ape? *Learn. Behav.* 32, 36–52.

Received: 25 July 2011; accepted: 11 October 2011; published online: 15 November 2011.

Citation: Chater N, Johansson P and Hall L (2011) The non-existence of risk attitude. *Front. Psychology* 2:303. doi: 10.3389/fpsyg.2011.00303

This article was submitted to *Frontiers in Cognition*, a specialty of *Frontiers in Psychology*.

Copyright © 2011 Chater, Johansson and Hall. This is an open-access article subject to a non-exclusive license between the authors and Frontiers Media SA, which permits use, distribution and reproduction in other forums, provided the original authors and source are credited and other Frontiers conditions are complied with.