

Selected References on Bias

Berlin, L. (2007). "Radiologic errors and malpractice: a blurry distinction." AJR Am J Roentgenol **189**(3): 517-522.

Bernstein, D. M., et al. (2007). "Hindsight Bias and Developing Theories of Mind." Child Development **78**(4): 1374-1394.

Although hindsight bias (the "I knew it all along" phenomenon) has been documented in adults, its development has not been investigated. This is despite the fact that hindsight bias errors closely resemble the errors children make on theory of mind (ToM) tasks. Two main goals of the present work were to (a) create a battery of hindsight tasks for preschoolers, and (b) assess the relation between children's performance on these and ToM tasks. In two experiments involving 144 preschoolers, 3-, 4-, and 5-year olds exhibited strong hindsight bias. Performance on hindsight and ToM tasks was significantly correlated independent of age, language ability, and inhibitory control. These findings contribute to a more comprehensive account of perspective taking across the lifespan.

Ciatto, S., et al. (2007). "Interval breast cancers in screening: the effect of mammography review method on classification." Breast **16**(6): 646-652.

Surveillance of interval cancers (IC) lacks standardisation of review methodologies. We investigated the extent to which 'informed' or 'blinded' review may affect IC classification. This is a retrospective study of 100 validated screening mammograms (20 IC, 80 negative screens) independently reviewed by six radiologists. Three sequenced review methods with increasing information were used: (1) blinded (no IC information, case mix), (2) partially informed, and (3) fully informed. IC 'screening error' (SE) reports averaged 24% (10-40), 33% (20-55), and 42% (35-50) for phases 1, 2, and 3, while 'minimal signs' (MS) reports averaged 6% (5-15), 10% (10-20), and 20% (15-30), respectively. Negative mammograms classification was MS in 18% (7-39) or SE in 19% (11-29), respectively. MS or SE classification was more likely for method 2 (OR=1.78, p=0.033) and method 3 (OR=3.91, p=0.000) relative to method 1, but no reader effect was evident. Inter-observer agreement in classifying at method 1 was slight (k 0.20), lowest (k 0.06) for MS, and fair (k 0.25) for negative and SE categories. More 'informed' review is more likely to yield an IC classification as MS or SE. Due to expected variability, review methods need standardisation to improve screening quality. Our data support blinded review of IC in mammography screening.

Garcia-Retamero, R. and M. K. Dhimi (2012). "On avoiding framing effects in experienced decision makers." Q J Exp Psychol (Hove).

The present study aimed to (a) demonstrate the effect of positive-negative framing on experienced criminal justice decision makers, (b) examine the debiasing effect of visually structured risk messages, and (c) investigate whether risk perceptions mediate the debiasing effect of visual aids on decision making. In two phases, 60 senior police officers estimated the accuracy of a counterterrorism technique in identifying whether a known terror suspect poses an imminent danger and decided whether they would recommend the technique to policy makers. Officers also rated their confidence in this recommendation. When information about the effectiveness of the counterterrorism technique was presented in a numerical format, officers' perceptions of accuracy and recommendation decisions were susceptible to the framing effect: The technique was perceived to be more accurate and was more likely to be recommended when its effectiveness was presented in a positive than in a negative frame. However, when the information was represented visually using icon arrays, there were no such framing effects. Finally, perceptions of accuracy mediated the debiasing effect of visual aids on recommendation decisions. We offer potential explanations for the debiasing effect of visual aids and implications for communicating risk to experienced, professional decision makers.

Glyptis, P. T. and D. S. Givens (2011). Developing a True Blind Review. ACR Bulletin.

Gong, J., et al. (2013). "The framing effect in medical decision-making: a review of the literature." Psychol Health Med.

The framing effect, identified by Tversky and Kahneman, is one of the most striking cognitive biases, in which people react differently to a particular choice depending whether it is presented as a loss or as a gain. Numerous studies have subsequently demonstrated the robustness of the framing effect in a variety of contexts, especially in medical decision-making. Compared to daily decisions, medical decisions are of low frequency but of paramount importance. The framing effect is a well-documented bias in a variety of studies, but research is inconsistent regarding whether and how variables influence framing effects in medical decision-making. To clarify the discrepancy in the previous literature, published literature in the English language concerning the framing effect was retrieved using electronic and bibliographic searches. Two reviewers examined each article for inclusion and evaluated the articles' methodological quality. The framing effect in medical decision-making was reviewed in these papers. No studies identified an influence of framing information upon compliance with health

recommendations, and different studies demonstrate different orientations of the framing effect. Because so many variables influence the presence or absence of the framing effect, the unexplained heterogeneity between studies suggests the possibility of a framing effect under specific conditions. Further research is needed to determine why the framing effect is induced and how it can be precluded.

Gunderman, R. B. (2009). "Biases in radiologic reasoning." AJR Am J Roentgenol **192**(3): 561-564.

OBJECTIVE: The purpose of this article is to outline common biases in medical reasoning that contribute to avoidable errors in diagnostic and therapeutic decision making. **CONCLUSION:** By recognizing and understanding common biases in medical reasoning, we can more effectively counteract them.

Harley, E. M., et al. (2004). "The "saw-it-all-along" effect: demonstrations of visual hindsight bias." Journal of experimental psychology. Learning, memory, and cognition **30**(5): 960-968.

The authors address whether a hindsight bias exists for visual perception tasks. In 3 experiments, participants identified degraded celebrity faces as they resolved to full clarity (Phase 1). Following Phase 1, participants either recalled the level of blur present at the time of Phase 1 identification or predicted the level of blur at which a peer would make an accurate identification. In all experiments, participants overestimated identification performance of naive observers. Visual hindsight bias was greater for more familiar faces--those shown in both phases of the experiment--and was not reduced following instructions to participants to avoid the bias. The authors propose a fluency-misattribution theory to account for the bias and discuss implications for medical malpractice litigation and eyewitness testimony.

Hilbig, B. E. (2012). "How framing statistical statements affects subjective veracity: validation and application of a multinomial model for judgments of truth." Cognition **125**(1): 37-48.

Extending the well-established negativity bias in human cognition to truth judgments, it was recently shown that negatively framed statistical statements are more likely to be considered true than formally equivalent statements framed positively. However, the underlying processes responsible for this effect are insufficiently understood. Therefore, a multinomial processing tree model is herein proposed to distinguish between differences in (a) knowledge or (b) response bias that may account for the framing effect. Three model validation experiments supported the psychological

interpretability of model parameters. Model application revealed that the framing effect can be considered a bias: Given insufficient knowledge, individuals more likely guessed "true" when faced with a negatively framed statistical statement. The probability of conclusive knowledge, however, remained constant across frames. In summary, this article puts forwards and validates a formal model that can be used more generally to investigate processes underlying truth judgments. Based on this model, it is herein shown that one particular phenomenon - framing effects observed for statistical statements - can be considered a response bias, rather than the upshot of differential knowledge.

Lau, J. S.-H. and L. Huang (2010). "The prevalence effect is determined by past experience, not future prospects." Vision Research 50: 1469-1474.

In a laboratory task similar to an X-ray baggage search at an airport, Wolfe, Horowitz, and Kenner (2005) reported a "prevalence effect" (i.e., a very high miss rate) when the presence of a target is very infrequent. The present study tested whether this prevalence effect is the result of a voluntary top-down control for future prospect or an implicit bottom-up priming from past experience. Experiments 1 and 2 showed that, regardless of instructions given on the likelihood of target presence, the magnitude of prevalence (i.e., the miss rate) was determined only by the actual prevalence of the target. In Experiments 3 and 4, target prevalence was indicated by background color on a trial-by-trial basis. Some blocks (i.e., constant blocks) were either comprised of all high-prevalence trials or all low-prevalence trials, whereas in other blocks (i.e., mixed blocks) high-prevalence and low-prevalence trials were randomly mixed. Target prevalence significantly affected the miss rate in the constant blocks, but had no effect in the mixed blocks. Overall, the prevalence effect is essentially the result of past experience and is not affected by future prospect.

Simons, D. J. and C. F. Chabris (1999). "Gorillas in our midst: sustained inattention blindness for dynamic events." Perception 28(9): 1059-1074.

With each eye fixation, we experience a richly detailed visual world. Yet recent work on visual integration and change direction reveals that we are surprisingly unaware of the details of our environment from one view to the next: we often do not detect large changes to objects and scenes ('change blindness'). Furthermore, without attention, we may not even perceive objects ('inattention blindness'). Taken together, these findings suggest that we perceive and remember only those objects and details that receive focused attention. In this paper, we briefly review and discuss evidence for these cognitive forms of 'blindness'. We then present a new study that builds on classic studies of divided visual attention to examine inattentional

blindness for complex objects and events in dynamic scenes. Our results suggest that the likelihood of noticing an unexpected object depends on the similarity of that object to other objects in the display and on how difficult the priming monitoring task is. Interestingly, spatial proximity of the critical unattended object to attended locations does not appear to affect detection, suggesting that observers attend to objects and events, not spatial positions. We discuss the implications of these results for visual representations and awareness of our visual environment.

Tversky, A. and D. Kahneman (1981). "The Framing of Decisions and the Psychology of Choice." Science **211**(4481): 453-458.

Summary. The psychological principles that govern the perception of decision problems and the evaluation of probabilities and outcomes produce predictable shifts of preference when the same problem is framed in different ways. Reversals of preference are demonstrated in choices regarding monetary outcomes, both hypothetical and real, and in questions pertaining to the loss of human lives. The effects of frames on preferences are compared to the effects of perspectives on perceptual appearance. The dependence of preferences on the formulation of decision problems is a significant concern for the theory of rational choice.