

Kaleidoscope

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Trigger warning: the following contains disturbing content and it might be harmful for some. We use alerts so that individuals with traumatic histories can avoid unnecessary provocation of symptoms: consider it the psychiatric equivalent of the epilepsy risk warning ‘the following contains flashing images’. This seems sensible, given how avoidance of trauma-resembling or reminiscent situations and distress at their occurrence are part of the post-traumatic stress disorder (PTSD) diagnostic criteria. However, there is a dearth of data to support this approach; Jones *et al* randomised 451 trauma survivors to receive, or not receive, a trigger warning before reading potentially distressing pieces of literature.¹ These ranged from neutral (for example a character description from *Moby Dick*) through mildly distressing (for example a battle description from *Flags of our Fathers*) to markedly distressing (for example the murder scene in *Crime and Punishment*), and were presented in a randomised order. The warnings made no difference in terms of self-reported emotional reaction or anxiety, even in individuals with PTSD caused by a trauma similar to that read about. Indeed, the authors found that trigger warnings reinforced counter-therapeutic self-views of trauma being a core part of their identity. The wider use of trigger warnings has encompassed debates from curtailment of free speech and academic freedom, through inadequately preparing individuals for the real world, to creating inclusive environments and allowing victims of trauma to make informed decisions about engaging with and preparing for difficult discussions. However, beyond the sociological, the science now suggests that they are useless at best, potentially harmful at worst.

Seven million people in the UK are informal caregivers. What is the psychological toll of this donation of emotion and time?

Rebecca Lacey and colleagues analysed data over time from the large and nationally representative UK Household Longitudinal Study.² About one-fifth of respondents reported becoming an informal caregiver on at least one occasion over the 7-year period. Interestingly, formal caregiving was associated with increased psychological distress in women, but not in men. As one might anticipate, long-term (over 3 years) caregiving extracted the greatest toll, along with repeated shorter-episodes of care. The gender differences warrant discussion: it is very clear that women provide far more caregiving overall, especially of long duration, but in men who did this, there were no changes in psychological distress regardless of their pattern of provided care. The authors note that there are data to show that women caregivers are more likely to take on more onerous responsibilities and look after those with the most need, so there are likely gender differences in intensity and carer ‘wear and tear’. Informal caregiving saves the UK economy a large amount of money, but comes at an emotional cost. With an ageing population, it is all very likely to increase even further in the future. It seems timely to address this through better recognition of this work, its burden and in the management of carers’ mental health.

Plato taught that honesty is, for the most part, less profitable than dishonesty.

To test this, Cohn *et al* handed in 17 000 lost wallets over 355 cities in 40 countries around the globe to see if they were returned.³ Classical economic theories rooted in rational self-interest would predict honesty decreases as a function of material incentives for dishonesty increase – so the more money the wallet contained, the more likely people are to keep it. Psychological

theories provide evidence that similarly, we will also act in self-interest and cheat but only if there is no pressure to reflect and negatively update our own self-image (i.e. we will cheat when no one is looking). In the 40 countries, the researchers handed in ‘found’ wallets to receptions in public buildings with receptions (such as museums, banks, post offices and police stations), with see-through wallets visibly displaying the name and email address of the owner. They varied the amount of money also visible in the wallet – either none, or the local currency equivalent of 13.45 US dollars – and all contained a key and grocery list. Each wallet was delivered with a standard script explaining it was found nearby, asking the receiver to help by dealing with the wallet and then the researcher left leaving no contact details or asking for a receipt. Each wallet had a unique email address, which was then checked 100 days later to see if contact had been made.

Consistent across 38 of the 40 countries, if the wallet contained no money, the likelihood of contact was 40%, increasing to 51% when there was money present. It is left as an exercise to the interested reader to see which countries had the highest and lowest absolute rates (the UK ranked about midway). The researchers propose that one reason for their results was that the amount of money was not substantial. So they ran a ‘big money’ condition in Poland, the UK and the USA where the wallets contained 0, 13.45 or 94.15 US dollars equivalents. The big money condition had the effect (across all three countries) of increasing the reporting rate. Then, they tested whether report rate of lost wallets was related to gain to the recipient (the person tasked with returning the wallet) or gain to the wallet owner. Here, the recipient has to decide if the key’s value to the owner (but where there is no personal monetary gain) is motivating enough to report the wallet. They found people were 9.2% more likely to return the wallets containing keys than those without. Interestingly, they surveyed 279 US academic economists on likely outcomes: they predicted the opposite to that found, namely that higher amounts would lead to less honesty. The survey obviously did not include Plato, but his idea appears to have traction in the academy.

Albert Camus, an admirer of Plato, taught ‘You are forgiven for your happiness and your successes only if you generously consent to share them’; substitute ‘data’ for ‘happiness’ and ‘code’ for ‘successes’ and you have a working slogan for reproducible science.

Addressing the reproducibility crisis is necessary in the era of #FakeNews, and we might reasonably want to examine the code and data that yielded published scientific results – especially in contemporary research where data are so large and complex. One persistent obstacle for biomedical research is that researchers often rightly insist they do not have consent to share data because it is confidential, for example in individual patient- or participant-level data (IPD). There exists a spectrum of ‘transparency’ for the data and code; at one end, full transparency would mean the researchers provide all the data (IPD) in its raw format and the complete code ‘pipeline’. If this is not possible, the authors provide an abstraction of the IPD that is sufficient to reproduce the tabular results or graphs upon which their conclusions rest. One solution is ‘safe havens’ where the data are co-located with computational resources that facilitate analysis, all behind a secure firewall. Researchers can then use the data on the computing facilities inside the firewall by accessing a ‘virtual machine’ remotely.

This does not help if you are a reviewer (or an independent researcher) operating outside that firewalled safe haven without easy access. One answer is to outsource reproducibility tests to a trusted body who issue a trusted ‘certificate’ that informs all interested parties. A system like this for French academics (‘cascad’) is described by Pérignon *et al*.⁴ Researchers use a safe haven to do

their research on sensitive data via a virtual machine. When the researchers submit a paper and code to 'cascad', a dedicated expert makes a copy of the virtual machine and then works through the code inside the safe haven. A report is compiled listing any discrepancies between the submitted manuscript and the expert's reproducibility attempt (for example, where the code yields a statistical test result that differs numerically from that reported in the manuscript). This report then goes to a 'cascad' reviewer (expert in the academic field) who then assesses the 'reproducibility' of the paper. A certificate is then issued to the author and is recorded in the 'cascad' database. The certificate is transferable to journals as a 'guarantee' of the reproducibility of the results. The authors argue that this means the code and metadata (but not the confidential data itself) can then be made available for others to use for example with their own, possibly confidential, data-sets that aids replication studies. As the volume of research output continues to increase year on year extracting the wheat from the chaff relies on improved processes to assess the robustness of novel findings.

Finally, Gala, whose songs infer learning from both Plato and Camus, taught 'Freed from desire, mind and sense purified' – but is it true? Desire has a powerful impact on how we see and make sense of the world: the other team played dirty, our children are exceptional and all the Kaleidoscope authors are delighted to find we are ageing better than our peers. This hubris and fallibility is part of our idiosyncratic charm as humans, but it has been unclear exactly how our yearnings have an impact on our information processing – does it change what we report, what we actually see or both? A novel study rewarded participants for correctly identifying the dominant element of an ambiguous image composed of a morphed face and scene during neuroimaging.⁵ Motivation was manipulated toward wanting the upcoming image to come from a particular category but, importantly, the task was incentivised for accuracy. Even when oppositely primed, responses reflected the manipulated motivation, regardless of reward. The authors applied a drift diffusion computational model (DDM) to the choice and reaction time data to dissect the contributions to motivational influence. DDM imagines choice as an accumulation of information between two options until a threshold is reached for

one. A bias in response, or what was actually seen, would appear as a higher starting point for one of the choices, meaning the distance to threshold is reduced. A bias in perception would be seen as an increase in the rate of evidence accumulation, so the threshold is reached more quickly. Participants' motivation was found to bias both the judgement and the visual processing, via distinct mechanisms. Neuroimaging revealed the nucleus accumbens, part of the salience network and long associated with motivation, activates in anticipation of the stimulus, being preparatory in nature and leading to a response bias. However, modulation of face- or scene-selective activity in the ventral visual stream predisposed the perceptual processing. In summary, the motivation to see something influenced both the classification and neural representation of the image. As scientists, the hallmarks of our discipline are the methods and rigour we embed in everything we do as a way to ward off the impact of our known vulnerability to bias. In the absence of those checks and balances, we are well aware that wanting something to be true can compromise our perceptions, even against our best interest. Knowing bias has an impact on dual aspects of visual perception, should find us fundamentally calling in to question everything from eyewitness testimony to the collateral psychiatric history obtained from family. To give the last word to Gala, she sang 'Want more and more, people just want more and more, freedom and love, what he's looking for'.

References

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