

Up-and-Coming Voices: The Science of Behavior Change

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As part of the 2021 APS Virtual Convention, researchers had the opportunity to connect with colleagues and present their work to the broader scientific community in the form of 15-minute Flash Talks. In this collection, we highlight talks by students and early-career researchers related to behavioral change.

Evaluation of an Intervention Based on Training Sessions to Increase the Use of Control Charts in Hospitals

Laura Kudrna (*University of Birmingham*)

What did the research reveal that you didn't already know about the use of control charts in hospitals?

In health care, control charts illustrate variations in processes that could ultimately affect patient outcomes. Examples of topics on control charts include monthly changes in patient waiting times to see a specialist and staff compliance with diagnostic regulations. Control charts display data in a way that allows the reader to distinguish noise from the signal in the data; that is, to spot patterns that may warrant further investigation.

Despite their appeal, many hospitals in England do not appear to use control charts to guide decision-making. They seldomly appear in publicly available documents called “board papers” that hospital board members discuss during meetings. Training sessions to improve uptake were established as part of an initiative called Making Data Count (#PlotTheDots). Our research aimed to discover if the training was effective by comparing hospitals that received the training with similar hospitals that did not.

Training alone usually does not create behavior change. However, hospitals taking part in the training subsequently used more control charts in their papers than untrained hospitals. Interestingly, staff in training hospitals who did not change control chart usage very much still said the training was worthwhile—underscoring the importance of using observational outcomes to reduce phenomena like social desirability bias.

How might your findings improve this use and potentially enhance hospital outcomes?

Other research shows that providing control charts to hospitals reduces adverse patient outcomes. Our study suggests that a more scalable approach encouraging hospitals to make their own control charts can improve their uptake. It may be beneficial to roll out the training more widely and assess why it was effective, such as the potential role of the implementation climate.

Trust and Trust Funds: People Have Less Faith in Those With Higher Socioeconomic Status

Holly Engstrom, *Kristin Laurin, Toni M. Schmader (The University of British Columbia)*

What did the research reveal that you didn’t already know about our likelihood to trust others, particularly when stereotypes involving economic status are involved?

We found that our participants trusted people with lower socioeconomic status (SES)—that is, people with lower incomes, less education, and less prestigious jobs—more than people with higher SES. This was especially surprising because our studies involved trusting someone else with money. You might think that people would assume that someone who is in a bad economic situation might be more tempted to steal money and therefore be wary of trusting them, but we found that this is not the case. Instead, people stereotype lower-SES folks as moral, honest, good people, whereas they suspect that higher-SES folks might be immoral, greedy, and selfish, and that stereotype seems to explain why people place more trust in those with lower SES.

How might your findings improve our understanding of these issues?

These findings suggest that in general, when deciding to trust others, people place less weight on whether the other person's situation might tempt them to act immorally and more weight on whether the other person seems moral. But there is still a lot of research to do to understand these issues. For example, the balance of these two considerations may shift in different situations. If you are trusting someone with a lot of money, you might pay more attention to their economic situation if that could tempt them to betray you and steal the money. The nature of these considerations might also shift in different situations. If you are trusting someone to babysit your child, you would probably want someone who is both moral and competent. People typically stereotype lower-SES people as more moral but less competent than higher-SES people, so it is not clear how SES would influence trust in a situation that involves both morality and competence. Overall, though, our findings suggest that people with bigger trust funds can expect to get less trust from others.

The Role of Frontal Polar Cortex in Patch Selection

Chun-Kit Law (*The Hong Kong Polytechnic University*), Nils Kolling (*University of Oxford*), Chetwyn C. H. Chan (*The Education University of Hong Kong*), Bolton K. H. Chau (*The Hong Kong Polytechnic University*)

What did the research reveal that you didn't already know about the role of the frontal polar cortex in selections between patches?

In our daily lives, important decisions often pertain to selection between complex patches—options that determine the items we will encounter in the future (e.g., a fresh graduate selects an industry that determines their likely job opportunities). To scrutinize the neural mechanisms underlying patch selection, we combined behavioral testing, computational models, and brain imaging. Our results revealed that the frontopolar cortex (FPC) subserved the encoding and comparison of values of the patches. Crucially, we systematically compared the multivariate signals of the FPC and of a series of deep learning models. This revealed that FPC was involved in multiple parallel processes to extract and integrate the multiplex features embedded in the patches to guide decisions. FPC was also capable of flexibly selecting relevant patch features in response to the external contexts. Our results are in line with the implicated roles of FPC in related processes such as abstract reasoning and information integration. Furthermore, our novel approach of inspection of FPC activity with deep learning models provides more in-depth understanding of the multiple, parallel neurocomputations during patch selection.

How might your findings improve our understanding of these issues?

Economists have long believed that choice preference can be quantified as utility such that people can make any kind of decisions—even comparing apples and oranges. Over three decades, neuroscientists have put forth the neural common-currency hypothesis as the biological basis of utility. Such a proposition is supported by the observation that the ventromedial prefrontal cortex (vmPFC) encodes the

utility of a wide variety of items (e.g., money, food, and trinkets). However, our findings refute the neural common currency hypothesis by showing the dissociable roles of the vmPFC and FPC—the vmPFC only encoded the utility of items, but the FPC encoded the utility of patches. This double dissociation between FPC and vmPFC sheds light on the functional specialization of prefrontal subregions to meet the specific demands of choices—the FPC involved in specific decisions that involve complex information in nature.

Intention in Action: Towards an Agent-Centered Perspective on Cheating and Rule-Breaking

Roland Pfister (*University of Wuerzburg*)

What did the research reveal that you didn't already know about compliance with rules?

Our research highlights the intriguing possibility that the human cognitive system is geared toward rule following by its very design. That is, we are consistently biased toward compliance with rules even in situations in which rule breakers do not have to fear sanctions, negative social evaluations, or other negative consequences. It goes without saying that the latter influences likely play an important role in many everyday decisions—but our tendency to abide by the rules runs deeper than this.

The proposed bias toward rule compliance, ironically, becomes evident when taking a close look at the behavior of rule breakers. Even when violating a rule eventually, these agents show subtle signs of conflict between rule following and rule breaking that we have captured in behavioral measures and electrophysiological recordings alike. Such conflict even occurs when there are no sanctions for rule-violation behavior whatsoever, and this even holds true for people who are prone to breaking rules, such as convicted criminals or children and adolescents with conduct disorder.

These findings add novel evidence in support of the idea that the human brain has considerable difficulty overcoming anything it has previously accepted as correct—it is impossible to unlearn on the fly what we have once accepted as fact. This mirrors recent findings on lying and dishonesty, which come with a similar tug-of-war between truthful responding and its dishonest counterpart.

What we do not know yet is whether there are relevant cultural differences in how rules are represented and put into action, and whether different types of rules (say: prescriptions as compared to prohibitions) are picked up and retrieved with similar ease. But we now know how and where to look for such differences.

How might your findings improve our understanding of cognition and behavior surrounding rules?

If we want to foster rule compliance, we are well advised to focus on how to communicate a rule as clearly and efficiently as possible. This alone might have a similarly strong—or even stronger!—impact on

compliance as compared to a focus on sanctions and punishments for rule breaking.

When evaluating cognition and behavior surrounding rules, we further have to distinguish between the black-and-white nature of whether or not a person follows a rule as compared to potential signs of conflict that point toward the retrieval of rule-based action tendencies even in case of rule violations. In many cases, the eventual outcome will be of main interest in applied settings, but zooming in on how an action comes about offers unique cues for understanding what actually happens in the mind of a rule breaker.

Another intriguing question is whether we should always be interested in promoting rule following. The answer to this is: No, we shouldn't! Indeed, positive and desirable behaviors such as creativity or moral courage, by definition, are violations of current rules or norms. Highlighting the cognitive challenges inherent in breaking rules may help us appreciate these behaviors even more and might lead to the discovery of elegant means to support creative problem-solving in the future.

Computational Mechanisms for the Effect of Acetaminophen on Risky Decision-Making

Xiaoyu Zeng, Zizhou Li, Yina Ma (Beijing Normal University)

What did the research reveal that you didn't already know about acetaminophen and behavior?

One of the most novel parts of this research was that we simultaneously applied two complementary computational models—one for value computation and one for evidence accumulation—to investigate how acetaminophen affects the underlying computational processes of risky decision-making. This advantage helps to reveal two interesting findings. First, we found that individuals given acetaminophen (vs. matching placebo) showed a lower decision threshold (less conservative) during the risk evidence accumulation process. Second, we found gender differences in the effects of acetaminophen on other computational processes. Acetaminophen increased females' risky choices by reducing the valuation of losses, increasing the efficiency of processing risk information, and shifting the a priori starting point toward risky options. However, the opposite pattern of acetaminophen was observed in males, making them more averse to risk and loss and less inclined to make risky choices.

How might your findings improve our understanding of (and potential interventions for) how this common drug can impact risky decision-making?

First, our study contributes to providing a computational account of the gender-independent effect of acetaminophen on risky decision-making: Acetaminophen drives less cautious and more decisive decisions (lower decision threshold) and results in faster response time. Second, our study also contributes to highlighting the role of gender when investigating the effects of acetaminophen on risky decision-making. It has been long recognized that there are gender differences in the usage of painkillers

in survey studies as well as in the mechanism of acetaminophen in clinical studies. However, previous acetaminophen studies in the psychological domain tended to ignore the potential gender difference. Our study well captured the gender difference of the acetaminophen effects by using two complementary computational models. Our findings suggest that acetaminophen could affect several distinct but complementary processes during risky decision-making (i.e., the valuation of losses, the efficiency of processing risk information, and a priori starting points) and that acetaminophen's effects on these computations were opposite for males and females. These findings would otherwise be unidentifiable, as these computations cannot be measured using conventional approaches.

Together, these findings reveal the computational mechanisms underlying the gender-independent as well as the gender-dependent effect of acetaminophen on risky decision-making.

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