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The pragmatic structure of indeterminacy: Mapping possibilities as context for action

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Abstract

Social psychology studies how situations cause behavior. Situations are partly defined by a matrix of possibilities (including probabilities and contingencies), and so human responses are caused not merely by realities but also by possibilities—even including some possibilities that never materialize. The human mind has complex abilities to recognize, imagine, and deal with possibilities. Two important dimensions of possibility, here labeled horizontal and vertical, differ as to how controllable the outcome is for any particular agent and where the value basis originates. Success/failure is an example of the vertical dimension and normally is only partly controllable, whereas open choice such as ordering off a menu is an example of the horizontal dimension. Possibilities and agency develop complex relationships to time: The future is defined by alternative possibilities whereas the past cannot be changed, though it can be re-imagined counterfactually and also reinterpreted. Last, we highlight the problem of how possibilities and probabilities combine. Statistical analysis of variance strategies offer three models of combination: independent and additive (like main effects), damping versus intensifying each other (as in spreading interactions), or reversing each other's effects (as in crossover interactions).

Keywords

Agency, causality, choice, control, future, performance, time

The purpose of this essay is to suggest one way forward for researchers interested in human action, so-called free will, and decision making under uncertainty—that is, for researchers interested in how possibilities define the basic challenges of human life. We analyze possibilities as a fundamental aspect of the structure of situations. Social psychology has long defined itself as studying how situations cause behaviors. Attempting to develop a theory of situation structure based on a survey of independent variables in social psychology experiments, Baumeister and Tice (1985) found that many of these experimental manipulations consisted of what they labeled a "matrix of possibilities." That is, the individual confronts the situation as a set of assorted alternative possibilities, and responds on that basis. These included manipulations of the range of available options; degree of choice or control; specific opportunities (presence vs. absence), such as an escape option, or anticipating future interaction with

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the same people; incentive structure; power relations; competition; reinforcement contingencies; knowing that people will evaluate you; and others. The key point is that understanding how an individual responds to a situation depends heavily on what is possible in that situation (and what the individual perceives as possible, which may not be quite the same). Insofar as the situation causes behavior—a basic assumption underlying much research in social psychology—the structure of possibility is itself causal.

The individual agent acts upon and within the situation, including its changing sets of possibilities. For example, if you decide to pursue a career in law, you must take undergraduate classes and tests and submit applications to law schools. If do you so and receive offers of acceptance, choosing among them will create further options, but still, you may or may not end up as a successful lawyer. Many people who begin law school decide against completing it, and others fail, so only some even take the degree, and the path to remunerative success has further obstacles and pitfalls. Even if one does most things right, a brief ethical misstep, such as an impulsive sexual misdeed, can derail the career and lead in very different and decidedly unpleasant directions. On the other hand, many people do choose that life and succeed at it.

Thus, the essence of agency is operating in and on an environment that contains multiple possible courses of action. Different actions will evoke different possibilities and contingencies. The future thus confronts the agent as a matrix of maybe: Different choices and performances will lead to different possible future events, which in turn will bring up further sets of possibilities, as well as various outcomes, some of which are better than others (Baumeister et al., 2018). Each course chosen in the present will evoke contingent possibilities different from what other courses would evoke.

Perhaps the most ambitious implication is that psychology may need to develop new ways of understanding causality, so as to encompass how possibilities come and go, how mere possibilities shape action, and how events alter the structure of possibilities in any given situation. Many social scientists have borrowed their understanding of causality from the natural sciences, with an assumption of a linear unfolding of events over time as one thing leads to another. Newtonian physics settles rather easily into a deterministic framework, in which each momentary state of the world directly and inevitably causes the next. Looking ahead, psychology must construe an agent's behavior as immersed in possibilities, and the very fact that something is possible may alter behavior even if the possibility does not become real. As one example, Glass et al. (1969) showed that stress and behavioral impairments were greatly reduced by believing that one had an escape option—even though no one ever used the escape option.

Understanding how the human agent understands and deals with the multiplicity of future possibilities—and makes behavioral choices in that context—is a vital part of understanding the *condition humaine*. The agent does not confront a chaos of uncertain possibilities, so much as confronting a meaningfully structured set of options and contingencies. We undertake to provide a crude map of those. More precisely, the present article proceeds in the following fashion. First, we emphasize that basic psychological processes need to be understood as dealing not just with extant realities but with sets of possibilities. Then we make a fundamental and important distinction between two dimensions of possibilities, which differ importantly as to how much control the individual has over the outcome (and hence where the crucial value judgment resides). Because the agent can alter the future more than the past, a new understanding of time is required, based on the future as a set of possibilities for action, whereas possibilities are relevant to the past only in terms of reinterpretation and/or counterfactual imagination. Last, we recognize that possibilities and probabilities can combine in different ways, with the implication that a full understanding of human agency may require a revised notion

of causality that moves beyond simple, linear, and deterministic assumptions.

Recognizing possibilities

Much research on perception and cognition studies how well people can discern *what is there* (realities). This work could be complemented by greater focus on discerning *what could be there* (possibilities). Becoming aware of possibilities can be highly adaptive, and failing to spot opportunities or threats can be costly. The phenomenon of learned helplessness (see Seligman, 1972, 1975) is so costly precisely because the individual fails to realize that there is a possible escape from suffering. Animals (and, in later research, humans) who learn to be helpless simply endure their misery rather than capitalizing on the situational possibility for ending it.

There is some evidence that although animals can perceive specific possibilities to a limited extent, only humans can discern and prepare for multiple alternate possibilities. An experiment by Redshaw and Suddendorf (2016) presented subjects with the possibility of catching a treat that by random assignment fell out either on the left or the right. Across multiple trials, only human children past the age of three learned to use both hands to cover both openings. Smaller children and various adult apes failed consistently.

This entails a caveat on our earlier observation that the structure of possibilities is itself a cause. Most of that causal influence is mediated by the person's perception of it. Some possibilities can sneak up on a person unawares, such as when one trips and falls. But the agent operates mainly among the possibilities of which it is aware.

Horizontal and vertical dimensions

Mapping the realm of possibility is an exciting challenge for researchers in this new field. We propose that pragmatic indeterminacy includes at least two basic dimensions. These are are importantly and interestingly different with regard to psychological processes. We label them, heuristically, horizontal and vertical. The psychological agent operates very differently depending on whether the indeterminacy is horizontal or vertical. The difference is akin to success/failure versus ordering off a menu.

The key difference can be characterized in two ways: how much control the agent has over the outcome, and how the values are decided. On the vertical dimension, the valuation of the outcomes is built into the external situation: Some outcomes are objectively better than others. Likewise, on that dimension, the agent does not fully control the outcome. Hence we label it as vertical, following the convention that up is better than down. The paradigmatic example, again, is success versus failure. Success (up) is better than failure, by definition, and everyone knows this. But one cannot simply choose success and thereby make it so. Many people are frequently confronted with situations in which both success and failure are possible, indeed sometimes several gradations of each.

Thus, on the vertical dimension, one's wishes and values are not enough to dictate which possibilities are realized. Both players want to win the tennis match, but only one will succeed. To win, many things have to happen, only some of which are under your control. Under your control is trying to improve your performance: inputting high effort, executing skills appropriately, and mentally tracking the course of the competition and your opponent's patterns so you can improve your strategy.

In contrast, on the horizontal dimension, the value judgment is up to the individual agent to decide—because the agent fully controls which option will be realized. Relevant psychological processes involve appraising the options in relation to one's own values and preferences. The horizontal dimension is typically a matter of choice and thus entirely under the agent's control: whom to marry, what course of study to major in, even just what shirt to buy. Choosing between the fish and chicken menu options is not a matter of success or failure, but of

personal preference. In terms of situational structure, there is no inherent value judgment or hierarchy among the options. It is up to the agent to decide how to value them.

Instead of horizontal-vertical, one could label the dimensions external and internal. That's where the valuation is decided. (To be sure, most social scientists would agree that supposedly internal choices are strongly shaped and biased by external influences.) Nevertheless, the agent confronts a situation with multiple options, and it is up to him or her to decide which one is best.

As always with human behavior, things become complicated. Some decisions invoke both dimensions in the matrix of maybe. Pursuing the most desirable romantic partner may reduce controllability. It's presumably more difficult to win the heart of the highly desirable partner than of the less desirable one. Or in business or sports, taking the high-risk high-reward strategy is a perfectly viable choice on the horizontal dimension—but down the road, succeeding with that strategy is less assured than with the play-it-safe strategy, by definition.

The time dimension

Let us assume that the future is indeterminate (more than the past). All that past has led up to this moment. But different things are possible for the future. Crucially, only some of them will come true.

Objectively, genuine possibilities reside only in the future and the present. The flow of reality, the course of history of everything, is something like this. The future is a miasma of alternative possibilities. The present crystallizes one of those and rejects the others. The past is the repository of what previously happened in the present, and as such is unalterable. To be sure, the past is subject to reinterpretation and even wholesale denial. Nevertheless, some things definitely happened and others did not, and in the present it is too late to change those objective facts.

The study of possibilities is thus fundamentally concerned with time. Possibilities are about the future. Even the existence of alternative possibilities in the present is tenuous, given that what happens in the present is the confirming realization of some and the permanent nonrealization of others—and also given that the options in the present are generally linked to outcomes in the future. (Again, consider choosing what to eat or whom to marry: the options exist in the present, but they are selected based on the future.)

Here again, the human evolved in ways that far surpass its animal relatives. The simple animal mind looks for the best possibility right now, at most using well-learned expectancies to project a few minutes into the future. The human agent can project into the future and calculate which options might be best in the long run. A huge adaptive advantage of this increased power of prospection is that the human mind can reject the choice that is most appealing right now based on mentally simulating and evaluating what will be the best in the long run.

How possibilities combine

Another issue for possibilities research is to study how possibilities and probabilities combine. As already stated, choices in the present "matrix of maybe" lead to more possibilities in the future in one direction while closing off possibilities in other directions. Marrying a highly attractive person brings the rewards of living with someone who is pleasant to see and who may enhance your status—while evoking other concerns, such as the increased probability that your partner will have sex with someone else along the way. Even within the relationship, single choices create different sets of possibilities and probabilities. If an ordinary person marries a rich and famous movie star, who do you think will end up washing the dishes and taking out the garbage?

Essentially, your choices set off different causal processes. These may combine in different ways. Statistical analysis theory offers three basic ways that probabilities can combine, in

addition to some lavishly complicated ones. Let's start with the basics.

First, and probably most common, is that the different causes each change the probability of an outcome—but independently. One cause may raise the odds by 5%, another may decrease it by 2%, another increases it by 1%, and so on. In statistical terms, this is the world of main effects.

Second, and still pretty common, is that one cause will increase or decrease the effects of the other. In that sense, the two causes operate on each other to change the probabilities of various outcomes. This corresponds to what statisticians call a "spreading interaction." For example, some innovations such as the printing press or the internet will speed up cultural change. They don't cause the change but by spreading information so as to build consensus, they make change occur faster than it would without that innovation. (Some conservative regimes banned the printing press for many years, to prevent subversive viewpoints from being heard.)

Third, and most interesting—but almost certainly the least common—involves one cause reversing the effect of the other. This corresponds to "crossover interactions." As a classic historical example and puzzle, the catastrophic bubonic plague in 1300s Europe reduced feudal serfdom and increased freedom in Western Europe—while having the opposite effect in Eastern Europe (e.g. Fukuyama, 2011; Henrich, 2020). The same cause, an illness that killed a third or more of the population, had opposite effects on poor farmers' lives, depending on culture and geography.

Concluding remarks

An increased focus on the nature and structure of possibilities, including how human and even animal minds recognize and deal with them, is an exciting multidisciplinary challenge. Much social science collects data about how people deal precisely with situations that are essentially defined by multiple, alternative possibilities. Philosophy can also contribute much by elucidating the structure and even the metaphysical status of alternative possibilities. Indeed, even the much discussed quantum indeterminacy of subatomic physics raises questions about why alternative possibilities exist, how probabilities come to predict behavior in the aggregate but not the individual case, and what mysterious process is decisive in each specific instance.

The horizontal and vertical dimensions discussed here are preliminary steps in those directions. How the mind deals with possibilities depends on which dimension defines the situation. For the horizontal, the agentic mind just appraises the situation and chooses what it wants. (This may be much more complicated than it would seem, given that people are able to think that what is most appealing right now will lead to later regret or guilt.) For the vertical, it must accept that it has only partial control over the outcome, and it must put in high effort to exert that control (e.g. to win the tennis match), unlike the horizontal task of just picking what you want. Effective agency depends on perceiving what the possibilities are, appraising them as horizontal or vertical so as to determine the relevant sort of response, and, for the most advanced and sophisticated agents, understanding how the situational probabilities combine.

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