CHAPTER FOUR

Judging change: A flexible threshold theory

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Abstract

This chapter proposes a flexible threshold theory of change perception in self and social judgment. People's thresholds for judging change depend not only on the salience and quality of the evidence for change but also on people's beliefs about the extent to which acknowledging change would disrupt their immediate situation, and people typically prefer to avoid disruption. Accordingly, variables that exacerbate perceived disruption costs should lead people to contract their change thresholds (i.e., people should be slower and less open to concluding things have changed—and hence be less likely to take action) whereas variables that alleviate perceived disruption costs should lead people to expand their change thresholds (i.e., people should be quicker and more open to concluding things have changed—and hence be more likely to take action), even going beyond the salience and quality of the evidence. Moreover, these effects should emerge independently from change direction (i.e., for both declines and improvements alike) so long as signs of change bear on perceived disruption costs. I review empirical support for these propositions and use the theory to generate novel

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predictions, contributions, and applications. The theory offers novel explanations for diverse self and social phenomena, from how people respond (or fail to respond) to fluctuating climates and economies to how people respond (or fail to respond) to worsening personal conditions and burgeoning social progress. People flexibly adjust their thresholds for judging change from the past based on how they think it will affect their presents. This flexibility is adaptive at short time horizons but maladaptive at long time horizons.

Nearly every conceivable aspect of life fluctuates over time. Illnesses come and go, markets have bear days and bull days, weather warms and cools, and so on. Change is the only constant. Some change, however, amounts to more than mere fluctuation—it signals a meaningful shift within the entity. At some point, for instance, regular or extreme bouts of ill-health and hot temperatures might signal chronic conditions that should demand people's attention and prompt intervention.

In the current chapter, I refer to these points as change thresholds—meaning, the points at which things have officially declined or improved in a more substantive and lasting manner, which presumably are also the points at which people become more likely to actually take action. However, note that change thresholds matter for influencing behavior only to the extent that people themselves judge things as indeed having crossed the threshold ("acknowledging the problem is the first step to its solution…": Dewey, 1910). A critical question therefore becomes: How *do* people judge change thresholds? The goal of this chapter is to help answer that question.

Traditional psychological accounts of change perception offer two possible answers: People's judgments of change thresholds are a function of the *salience* of the observed evidence for change as well as the *quality* of that observed evidence. From this perspective, so long as one knows how people are attending to evidence of change (e.g., perhaps they have kept a log of their declining health from day to day; high *salience*) and also how people are construing that evidence (e.g., perhaps their logging software was provided by a highly trustworthy doctor; high *quality*), one should be able to predict, at least somewhat reasonably well, people's judgments of change. For example, an individual who encounters highly salient and high-quality evidence of decline should be quicker to conclude that they are officially in trouble—relative to some internal or external benchmark—as compared to an individual who encounters lowly salient and low-quality evidence of decline (conditional on both people facing the same objective change).

The current chapter takes a different perspective. Although informational salience and informational quality surely both matter for discriminating change, I propose that underlying these factors is people's broader assessment about the value of registering that change. That is, when people attempt to determine whether or not something has officially changed, I propose that they essentially ask themselves *three* questions—not just two—with the third question serving as an ongoing underlying monitoring system that can also influence the first two.

First, the factor of *salience*: "What's the evidence for change?".

Second, the factor of *quality*: "What's the quality of the evidence?".

Third, and of critical interest to the current chapter: "What will happen if this change is real?"—a factor that I call *disruption costs*.

As I will put forth and detail throughout this chapter, people's monitoring of disruption costs guides many threshold judgments, even going beyond salience and quality alone. For example, this model can uniquely explain why people sometimes deny change in the face of highly salient and high-quality signals, or why people sometimes believe that change has indeed occurred despite lowly salient and low-quality signals—both as a function of people's perceived disruption costs of acknowledging change to begin with.

The remainder of this chapter outlines this theory in detail. First, I propose a traditional account of salience and quality for explaining how people judge change thresholds and perceive change. Next, I propose and review evidence for a flexible threshold model that incorporates people's perceived disruption costs in addition to (and often going over and above) salience and quality. Finally, I highlight unique contributions of the theory and use it to generate additional novel predictions, contributions, and applications for future research.

1. How people judge change thresholds: A traditional model

Traditional psychological accounts of how people judge change thresholds might be best understood as falling into one of two categories. First, large literatures have highlighted the role of informational *salience*. This factor essentially amounts to attention: For people to perceive something to have changed, they need to notice the change to begin with. Second, other large literatures have highlighted the role of informational *quality*.

This factor essentially amounts to evaluation: Once people notice a potential signal of change, the perceived diagnosticity of that signal will influence the extent to which people incorporate it into their judgments of concluding or denying change.

These two factors could be seen as occurring in serial information-processing fashion, whereby stage 1 is attention and stage 2 is evaluation. From this perspective, one can model people's crossing of change thresholds as a function of people first noticing a stimulus that might or might not reflect more lasting change ("What's the evidence for change?"; *salience*), and then attempting to judge the features of that stimulus in relation to bearing on change ("What's the quality of the evidence?"; *quality*). In turn, knowing people's calculations of these two factors should be both necessary and sufficient for determining to degree to which they move closer vs. farther toward crossing the threshold in their change judgments. Change perception is a function of a 2-way interaction between attention and evaluation. Fig. 1 depicts this traditional model.

1.1 Stage 1: Attention (informational salience)

Change is inherent to everyday life. As such, it is unsurprising that scholars across many fields have long been interested in understanding it. As early as around 500 BCE, the Greek philosopher Heraclitus famously argued that change is an essential physical law of the universe ("You cannot step into the same river twice": Heraclitus, *Flux*, 3.1, B12). In the 1600s, Sir Isaac Newton sought to develop a mathematical framework, as now built into the modern study of calculus, for charting and predicting how distant objects

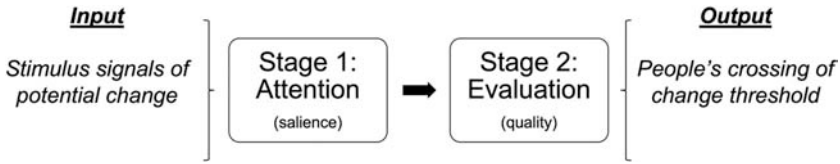

Fig. 1 A traditional model of how people judge change thresholds, as derived from existing psychological accounts. From this traditional perspective, people judge change thresholds as a function of a two-stage process. In stage 1 (attention), informational salience is key: People first notice a stimulus that might or might not reflect more lasting change ("What's the evidence for change?"). In stage 2 (evaluation), informational quality is key: People then attempt to judge the features of that stimulus in relation to bearing on change ("What's the quality of the evidence?"). Put another way, people's crossing of change thresholds is a function of a 2-way interaction between attention and evaluation.

continuously change their spatial locations (Baron, 1969). And still today, diverse fields from history to economics essentially aim to organize principles to make sense of past change and forecast future change (Staley, 2002).

These are just some examples of humanity's long history of trying to make sense of external change out in the world. Note, however, that in all these examples, the assumption is that things "out there" indeed change at some objectively measurable point. Things transform from *something* to something *else*, and therefore the resulting goal has been to develop tools to help calculate these changes or differences between before and after.

In turn, the study of change within the field of psychology also appears to have been inspired by this approach—that is, psychology has its own history of taking a more bottom-up approach to understanding change thresholds that paints people as perceiving change by passively intaking the presence of differences out in the world. The critical point here is that, across this research, the assumption is that things indeed cross change thresholds at some objective point, and people either register it or not based on their available attentional resources.

1.1.1 Crossing change thresholds via basic attention

Indeed, perhaps the most commonly investigated psychological feature of change perception entails the role of basic attention. From this view, people judge change thresholds by simply noticing change occur out in the world—and thus interesting findings have emerged in this literature by highlighting factors that disrupt people's ability to notice. For example, people are found to *fail* to perceive change when change unfolds too gradually to be appreciated (e.g., Simons, Franconeri, & Reimer, 2000) or when people become desensitized to its presence (e.g., Campbell, O'Brien, Van Boven, Schwarz, & Ubel, 2014). The popular metaphor of the "boiling frog" captures these ideas: A frog might immediately jump out of water that is already boiling, yet might continue to sit in water (to its own detriment) that starts out at a lukewarm temperature and gradually increases to boiling. Again, however, note the assumption: If water boils at the threshold of 212 °F (Chang, 2008), the focus here is simply on people's (in)ability to notice the objective information about change occurring (i.e., the point when 212° is crossed).

In this same way, other research finds that people miss the crossing of change thresholds because of competing distractions on their limited attention (Beck, Rees, Frith, & Lavie, 2001; Grimes, 1996; Wilken & Ma, 2004). In "change blindness" studies, people miss ostensibly obvious

changes (e.g., the surveying experimenter is swapped with a different person; a comical gorilla dances across the video playing right in front of one's eyes) to the extent that they are stuck in complex informational environments (e.g., when the swap occurs on a crowded public street with many other happenings; when people are required to complete cognitive tasks while the gorilla dances by; see Chabris & Simons, 2010; Simons & Ambinder, 2005). Likewise, some stimulus features are harder to notice than others—leading researchers to demonstrate how easy it can be to disrupt people's ability to notice the crossing of change thresholds that involve those features (e.g., subtractive change can be harder to notice than additive change: Adams, Converse, Hales, & Klotz, 2021; Agostinelli, Sherman, Fazio, & Hearst, 1986; visual change can be harder to notice than auditory change: Demany, Trost, Serman, & Semal, 2008). Again, change perception here is assumed to reflect responses to entities that exist "out there," with people either noticing or struggling to notice when those objective thresholds are crossed.

Research by Rensink and colleagues (e.g., Rensink, O'Regan, & Clark, 1997) makes this point most clearly. They argue that successful change detection requires conscious and effortful attention on the part of the perceiver in order to occur—put simply, that "focused attention is needed to see change" (Rensink, 2002, p. 259). In contrast, and as I will put forth in Section 2 of this chapter, a flexible threshold model of change judgment can instead predict and explain when people nonetheless sometimes deny change despite even the most precisely focused attention.

1.1.2 Context effects on attention and change salience

If change perception depends on people attending to change to begin with, then other factors that influence people's attention (beyond outside distractors) should bear on their judgments of change thresholds accordingly. Ample research, for example, highlights context effects on the perceived vividness of information and the likelihood with which people bring information top of mind to inform their judgments—even when that now-made-salient information is not necessarily helpful for solving the judgment task at hand (e.g., people's use of accessibility and availability heuristics while under processing constraints: Kahneman, 2003; Schwarz, Bless, Wänke, & Winkielman, 2003; Weber & Johnson, 2006).

As applied to change perception and how people judge change thresholds, contexts that render signals of change more (vs. less) salient have indeed been found to influence people's threshold judgments. Weber's

Law (see Wixted, 2020) well-illustrates the role of context effects in the salience of signals of change, as it states that people's ability to detect marginal change will decrease as the absolute intensity of the stimulus increases. For example, the sudden appearance of 10 dots will immediately elicit perceptions of change in an existing visual space of one dot yet may go unnoticed in an existing visual space of 1000 dots, despite the fact that whatever influence "10 dots" should wield in shifting people's crossing of change thresholds is identical in both cases—*if* noticed equally. Researchers have used this logic to study change perception in domains like price discrimination, finding (for instance) that shoppers are less sensitive to noticing a price change (e.g., a new sale price) when that same exact discount is applied to more vs. less expensive goods (e.g., Monroe, 1973).

Going further, people are more likely to correctly notice when a visual scene has been altered from one state to another state when those changes occur within easily visible (and thus attention-grabbing) components of the scene (e.g., Scholl, 2000), within more interesting (and thus attention-grabbing) components of the scene (e.g., Rensink et al., 1997), within more centrally meaningful (and thus attention-grabbing) components of the scene (e.g., Kelley, Chun, & Chua, 2003), and within more personally relevant (and thus attention-grabbing) components of the scene (e.g., Jones, Jones, Smith, & Copley, 2003; Triesch, Ballard, Hayhoe, & Sullivan, 2003; Yaxley & Zwaan, 2005). Other factors that influence perceived salience wield similar effects. For example, people are found to fail to notice "obvious" signals of change—and thereby fail to cross change thresholds when they ought to—when their familiarity with other stimuli in an information space is sufficiently high so as to steal their attention from detecting the focal change at hand (e.g., Neuhoff, Schott, Kropf, & Neuhoff, 2014), or when the interstimulus presentation interval is sufficiently long so as to disrupt people's ability to maintain a memory of the original state for purposes of comparing it to the new state (e.g., Pashler, 1988).

The key point here is that this traditional model as proposed assumes that people begin the process of judging change thresholds only if they first notice signals of change to begin with. People start by essentially asking themselves, "What's the evidence for change?" In turn, their answers depend on the evidence for change that they have noticed and that is salient to them.

1.2 Stage 2: Evaluation (informational quality)

Attention alone, however, is insufficient for explaining when and why people cross change thresholds. Note, for example, prior research that has

found that people who directly attend to a changing stimulus (e.g., as revealed via eye-tracking) do not always report in their judgments that they in fact perceived a change (e.g., Drew, Võ, & Wolfe, 2013; O'Regan, Deubel, Clark, & Rensink, 2000).

To account for this gap, the traditional model here assumes a second step: After people attend to a stimulus that might suggest potential change, they then engage in a "sizing up" process involving trying to decode (either automatically or deliberately) the features of the stimulus that are or are not diagnostic of change. That is, people attempt to *evaluate the quality* of what they have indeed noticed as it bears on potential change.

1.2.1 Updating based on quality inferences

That people attempt to evaluate relevant informational quality (at least to some degree) before acting on it is a straightforward and well-supported claim. In research on persuasion, for instance, researchers have long argued that attitude change is a function of people's assessments of argument quality, either in terms of trying to directly analyze its objective merits or in being swayed to associate it with higher quality through other means (e.g., as outlined in the elaboration-likelihood model: Petty & Cacioppo, 1986). Likewise, basic tenets of models of Bayesian inference assume that people update their evaluative impressions based on newly observed evidence—especially when people deem the observed evidence to be sufficiently necessary and relevant to account for in the first place. In the context of judging change, for example, research on forecasting tournaments (e.g., events involving recruiting large groups of judges to make probability estimates about future changes in world news, which they repeatedly make and update over time, and then comparing their estimates to how reality unfolds) has found that the most accurate forecasters tend to be those who regularly update their estimates based on careful study of the evidence (e.g., Tetlock & Gardner, 2016). By the same rationale, this updating process has been shown to produce systematic errors in judging change to the extent that non-diagnostic signals of change are presented in environments that lead people to (mis)perceive them as diagnostic signals of change (e.g., Massey & Wu, 2005).

1.2.2 Different domains signal different qualities relevant to change

Other research suggests domain-level differences in perceptions of diagnostic qualities, thus producing corresponding domain-level differences in people's crossing of change thresholds. For example, Reeder and Brewer's (1979) model of dispositional attribution as a function of implicational

schemata posits that people draw on the diagnosticity of an observed behavior to determine what to weight and by how much in their judgment. Skowronski and Carlston (1987, 1989) used this logic to predict domain-level differences in how people judge others, in ways that bear on change perception. As an illustration, they unpacked two contrasting domains: the ability domain vs. morality domain.

In the ability domain, signs of positive change are typically more diagnostic than signs of negative change for discriminating between alternative trait categorizations, as naturally learned in typical everyday life. This has been shown to produce *positivity* biases in social judgment. For example, imagine a teacher is tracking a student's math performance over time and is tasked with judging the point at which the student is officially improving or declining. According to this model, the teacher will cross these change thresholds asymmetrically, such that they will need to see just a few exceptional performances before concluding that the student is improving whereas they will need to see many struggling performances before concluding that the student is declining (i.e., a positivity bias). As argued, this occurs because the teacher has learned these typical diagnosticity-associations by virtue of living everyday life: Non math-whizzes cannot flawlessly excel on math tasks whereas true math-whizzes can sometimes struggle on math tasks.

In the morality domain, however, it has been argued and shown that this relationship is flipped: Here, signs of negative change are typically more diagnostic than signs of positive change for discriminating between alternative trait categorizations as naturally learned in typical everyday life—thus producing asymmetric *negativity* biases in social judgment. For example, imagine a manager is tracking potential changes in an employee's honest ethical character over time. According to the model, the manager will need to see many honest behaviors before concluding that the employee is indeed honest and ethical whereas they will need to see just a few dishonest behaviors before concluding that the employee is dishonest and unethical (i.e., a negativity bias). This is the result of the same diagnostic learning process as above, simply reflecting the reverse association as it is learned in everyday life: Honest people cannot lie whereas liars can sometimes be honest.

In both cases, note that the broader point here relevant to the current chapter is in supporting stage 2 of the traditional model: People appear to judge change based on their inferences about the diagnostic quality of the evidence to which they attend.

1.2.3 Context effects on evaluation and change quality

If judgments of change thresholds depend on people's evaluations of the diagnostic quality of observed signals, then other factors that affect this evaluation process should bear on change perception accordingly. Indeed they do.

An illustrative model on this front is Ross's (1989) inference-based model of how people judge their own personal change vs. stability across different life stages and events. According to the model, seemingly-diagnostic reminders of possible change lead people to infer that they must have changed after all—even when this does not correspond to reality. For example, in one experiment (Conway & Ross, 1984), participants who were randomly assigned to complete a study-skills course later inferred that their test scores *must* have changed by a wider margin than participants who did not take the course—regardless of how much their scores actually changed from before and after. In another experiment (Eibach, Libby, & Gilovich, 2003), participants made various judgments about the extent to which they believed states of the world have gotten worse over time (e.g., whether a spiking crime rate reflected crossing the threshold of getting meaningfully more dangerous). Interestingly, participants who had (vs. had not) recently become parents reported higher rates of diagnosing the world as more dangerous, suggesting that contextual changes in motivationally-relevant self-states influenced people's judgments about the diagnosticity of potential change out in the world. It was argued, for example, that new parents are prone to suddenly believing that the world "must be" getting more dangerous, thanks to their newfound life circumstances that are motivating them to become more alert to threats to safety.

Other contextual shifts and differences have shown similar effects on change perception. On the one hand, some of these effects are posited to be motivated, as in the "parent" example above. For example, people across different ages and life stages tend to underestimate how much they will continue to change in the future as compared to the degree of change that they report having gone through over the equidistant past (dubbed "the end of history illusion": Quoidbach, Gilbert, & Wilson, 2013)—with the primary mechanism posited to be that people are motivated to disproportionately count favorable (vs. unfavorable) evidence of past change as high-quality signals of actual diagnostic change, thus making the thought of continued change to seem less necessary for further self-improvement ("First, most people believe that their personalities are attractive, their values admirable, and their preferences wise; and having reached that

exalted state, they may be reluctant to entertain the possibility of change": Quoidbach et al., p. 98). Such a process is more generally consistent with research on temporal self-appraisal theory (Wilson & Ross, 2001), which posits that people engage in emotion regulation by manufacturing the image of self-improvement over time, such as by discounting the quality of their past positive attributes (and thereby concluding that they indeed have changed a great deal from the past to the present).

On the other hand, some of these effects are posited to be non-motivated, reflecting more basic cognitive processing and judgment strategies. When people observe signals of possible change, one way that people reduce this ambiguity is to rely on other available information in the environment that can serve to help gauge the quality of those signals. This manifests in the form of looking to external comparison standards for points of reference. These reference points are often drawn from culture, with cultural differences in what counts as change being associated with people forming different threshold judgments in response to the same stimulus signals. Ji, Nisbett, and Su (2001), for example, found that Chinese participants inferred weaker diagnostic quality from observing a possible lasting pattern (e.g., Chinese participants were slower to infer that a series of fights between partners will necessarily lead to a split) as compared to American participants (e.g., American participants were quicker to infer that a split will necessarily follow), reflecting broader Eastern vs. Western differences in thinking about cyclical vs. linear change. Other such person-level differences are similarly found to predict corresponding differences in change judgments and perceptions (e.g., age differences in dialectical thinking: Grossmann et al., 2010).

Other reference points for change are drawn from more transient situational differences. For example, Levari et al. (2018) found that people tend to rely on the existing prevalence of a stimulus in order to form judgments about whether the presence of a new addition fits into that same category or not. For example, a purple dot can suddenly seem blue when judged in a context where blue dots are scarce (or, as put in current terms, people's threshold for judging when purple officially changes to blue depends on existing surrounding blueness). Bechler, Tormala, and Rucker (2019) found that people tend to believe that signals of change are of higher quality and therefore ought to be taken more seriously when they happen to cross categorical thresholds (what the authors refer to as "qualitative shifts"), holding constant the relative degree of change otherwise. For example, the act of changing someone's attitude by 3 scale points is judged

to be more persuasive when that movement happens to cross the mid-point of the scale. Ferguson and colleagues have argued that people's implicit attitudes are also attuned to available contextual information, such that people can and do change their implicit attitudes—specifically when people encounter signals of change that are highly diagnostic and believable, and that cause a reinterpretation of a past known state. For example, upon seeing a photograph of a disfigured face at Time 1, participants were found to respond negatively to this person on an IAT (implicit association test: Greenwald, McGhee, & Schwartz, 1998); but when then informed that the person's scars came from saving children from a house fire, participants' implicit responses at Time 2 to this same exact stimulus became positive (Mann & Ferguson, 2015; for a review, see Cone, Mann, & Ferguson, 2017).

All told: The central point and assumption here is that, according to the traditional model proposed here, people cross change thresholds and perceive change by evaluating the quality of the signals of change that they had noticed at the first stage. People essentially ask themselves at this second stage, "What's the quality of the evidence?" In turn, people appear to move closer vs. farther toward crossing the threshold in their change judgments depending on their answers (i.e., as perceived informational quality increases vs. decreases).

2. How people judge change thresholds: Flexible threshold theory

The current chapter builds on this traditional model by adding an underlying feature to it: people's monitoring of disruption costs. That is, I propose that change perception depends not only on the salience and quality of the evidence for change but also on people's beliefs about the extent to which acknowledging change would disrupt their immediate situation, and people typically prefer to avoid disruption. In effect, people's crossing of change thresholds is *not* just a function of a 2-way interaction between attention and evaluation (traditional model, Fig. 1)—I propose that it is a 3-way interaction between this traditional process and people's behavioral monitoring of disruption costs. This model proposes that people flexibly adjust their thresholds for judging change depending on how doing so would bear on present behavior, in addition to (and even sometimes beyond) salience and quality alone. Fig. 2 depicts this proposed model.

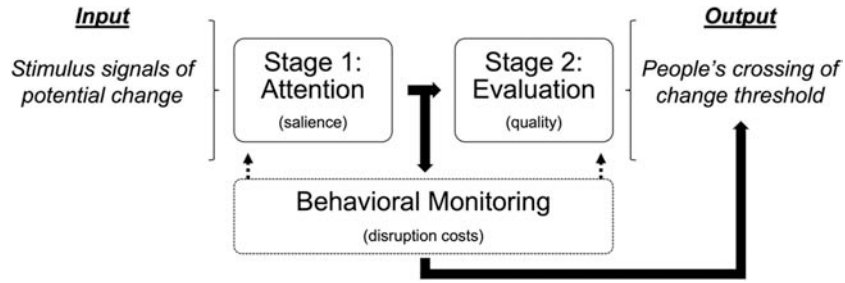

Fig. 2 A flexible threshold model of how people judge change thresholds, as proposed in the current chapter. From this perspective, there is an added feature to the traditional model (Fig. 1) such that people's monitoring of *disruption costs* ("What will happen if this change is real?") underlies their attention and evaluation throughout the change-judgment process. Put another way, people's crossing of change thresholds is *not* just a function of a 2-way interaction between attention and evaluation (traditional model, Fig. 1)—I propose that it is a 3-way interaction between this traditional process and people's behavioral monitoring of disruption costs.

2.1 What are disruption costs?

Disruption costs are a byproduct of the occurrence of a change. More specifically, I operationalize disruption costs as the costs to a person's time, effort, or other limited resource that the person incurs following a change to their immediate situation. When forming judgments of change thresholds, people essentially ask themselves, "What will happen if this change is real?" Disruption costs are higher when people answer this question along the lines of, "Much will change; I'll need to behave differently than how I've typically been behaving recently if this change is real." Disruption costs are lower when people answer this question along the lines of, "Little will change; I won't need to behave much differently from usual if this change is real."

It does not conceptually matter for the model whether disruption costs are actually realized, because the model is descriptive; it is designed to describe people's thought and decision process in registering a change to begin with (which, by definition, occurs before people discover the reality of its associated disruption costs). As such, what does conceptually matter for the model is that people *perceive* disruption costs to be real and as being likely to be realized. Note, however, that in Section 3, I will discuss directions for future research that pertain to mapping out when and why people are accurate vs. mistaken in their perceptions of disruption costs—which bears on the more prescriptive question of whether people's flexible use of thresholds is adaptive vs. maladaptive.

There are many examples of disruption costs. Take, for instance, people's thought process in trying to discern whether their recent ups-and-downs with ill-health are merely flukish fluctuations or whether they signal the onset of something more serious. If people indeed conclude the latter (and thus cross the change threshold), they know this means they will have to see the doctor and will need to make some other immediate behavioral changes. In this scenario, some people might be very busy at work at the moment and do not have much discretionary time or energy leftover to give, whereas other people might be facing low stress at work and have ample leisure. The former individuals face high disruption costs while the later individuals face low disruption costs. Or, consider the experience of trying to discern whether one's workplace culture has officially grown toxic over the years, based on a few recent controversies. People who strongly identify with the job and feel connected to their colleagues face high disruption costs if that decline is indeed real, as they may be forced to confront themselves and perhaps reconsider their life goals. In contrast, people who do not identify or feel particularly strongly face low disruption costs, as little self-reflection may be required if that decline is indeed real.

These examples need not be restricted to declines and the loss domain. As defined, note that disruption costs are non-valenced and therefore should emerge independently from change direction, meaning that they apply to gains and improvements as well. For example, consider a person who works to shed themselves of a personal trait that they dislike, such as a reserved person who has been pursuing their goal to become more assertive. At what point might they conclude that they have officially improved on this front? Disruption costs would be high if they are concerned that officially improving means they now have to act assertively in all aspects of everyday life moving forward, which may strike them as quite an effortful and intimidating change—which, as I propose here, will influence the point at which the person will judge themselves to have crossed the improvement threshold and perceive official self-improvement.

Finally, note also two other features of disruption costs as highlighted by these examples. First, disruption costs can come in many forms, ranging from the psychological (e.g., needing to re-adjust one's thinking in response to an identity threat) to the material (e.g., needing to invest time or energy into moving to a new environment), so long as people believe that they are behaviorally implicated in some way if the change is real. Second, note that, across these examples for both declines and improvements, disruption costs run orthogonally from both the informational

salience of change-cues and also from the informational quality of those change-cues (e.g., note that, in the example above involving ups-and-downs with ill-health, both kinds of individuals are assumed to calculate their decision in response to the same evidence of change).

2.2 Why and how do people monitor for disruption costs?

2.2.1 Why do people monitor for disruption costs?

In general, people typically prefer to avoid disruptions to their immediate situation. Needing to do something different tends to demand more from us as compared to continuing to do what we are already doing. Just as Newton (1687) describes inertia as being a fundamental force that guides movement through the natural world ("an object at rest stays at rest and an object in motion stays in motion"), a naïve physics like this appears to guide our movement through the psychological world as well. Doing nothing strikes us as easier than doing something. In turn, all else equal, numerous psychological literatures confirm that the path of least resistance is the path that people tend to take. From this perspective, it follows that people should be especially sensitive to monitoring for "the need to do something different"—or, as put in current terms, the need to respond to potential change as opposed to a lack of change—and in turn people should adjust their change perceptions depending on their capacities to behave differently in response to the occurrence of the change.

Support for the existence of such a monitoring system comes from research on the status-quo bias, which finds that people strongly prefer to maintain their current state of affairs. Both economic and psychological considerations have been put forth to explain the status-quo bias. For example, from a rationality-based economic perspective, change typically comes with transaction costs and risks of uncertainty to a greater degree than a lack-of-change does, and thus it is in one's self-interest to simply stay the course (e.g., Samuelson & Zeckhauser, 1988); and likewise from a more emotion-based psychological perspective, staying the course could reflect a desire to justify sunk costs and current endowments, and avoid perceived loss and regret (e.g., Eidelman & Crandall, 2012). Sameness signals safety (Zajonc, 2001). Action seems like it can risk causing more problems than inaction (Baron & Ritov, 1994). More broadly, the notion that people prefer to stick with easy defaults as opposed to switching to something new is also a core assumption in research on choice architecture and behavioral nudging (Thaler & Sunstein, 2008).

People, after all, are cognitive misers (Fiske & Taylor, 1991). When it comes to making decisions, our computational resources are inherently limited, and as such we tend to be drawn toward conditions that decrease rather than increase necessary computational effort—a welcome adaptation for enabling immediate decision action (Gigerenzer, 2008; Higgins, 1998; Kahneman & Frederick, 2002). People therefore are posited to tune their judgments to the demands of their current situations, taking into account their own available resources and the viability of acting in response (Balcetis, 2016; Bhalla & Proffitt, 1999; Schwarz, 2002). When people face "action crises" (e.g., a person who discovers hints that their romantic partner might be cheating on them, and thus they now face a stressful decision about what to do next), they are found to be more likely to engage in cost-benefit thinking (e.g., the person at this stage might become more likely to contemplate the costs vs. benefits of staying in the relationship: Brandstätter & Schüler, 2013).

Cutting across these ideas is the further notion that people care about maintaining a sense of consistency in their behaviors over time, as posited in theories of commitment and choice justification (e.g., Bem, 1972; Festinger, 1962), self-verification motivations (e.g., Swann, 2012), and assumptions of self-coherence (e.g., Ross, 1989; Sedikides, Hong, & Wildschut, 2023). People are highly attuned to threats to self-consistency in what they encode and remember both in everyday life (Epstude & Roese, 2008; Roese, 1997) and beyond. Clinical research on addiction recovery, for example, discusses the critical role of addressing people's denial of the existence of the problem, and commonly situates this denial in terms of a broader hesitancy for people to admit to negative changes in their identity (e.g., Kearney & O'Sullivan, 2003; Ward & Rothaus, 1991). Likewise, Kotter's (1996) influential model of change management in business contexts advises a series of steps that organizations should take when trying to encourage employees to get on board with organizational changes—with the first key step being to "create a sense of urgency," meaning to address employees' intuitive hesitancy to accept change to begin with.

Thus, all told and putting these ideas together: I propose that, because people generally prefer for their current circumstances not to be affected and thus prefer not to register change if it can be avoided (all else equal), people possess an underlying monitoring system that is sensitive to the degree to which potential change would affect them (i.e., that is sensitive to disruption costs)—and that people indeed account for this factor when

forming judgments about change thresholds in change perception (in addition to, and sometimes going beyond, the salience and the quality of the evidence for change). As I will review at greater length later in this section, variables that exacerbate perceived disruption costs should therefore contract people's change thresholds (i.e., people should be slower and less open to concluding things have changed—and hence be less likely to take action) whereas variables that alleviate perceived disruption costs should therefore expand people's change thresholds (i.e., people should be quicker and more open to concluding things have changed—and hence be more likely to take action).

2.2.2 How do people monitor for disruption costs?

As depicted in Fig. 2, I propose that people monitor for disruption costs throughout the judgment process, as opposed to reflecting a "stage 3" that necessarily follows the first two stages. In general, people indeed monitor their thought processes and operations; a primary function of metacognition is to serve as a helpful monitoring tool about the effectiveness of potential decisions to be made (Fiedler, Ackerman, & Scarampi, 2019; Nelson & Narens, 1990). Similar to how self-esteem theorists posit that underlying people's explicit reports of self-esteem is a monitoring system that gauges the extent to which their social inclusion with others is in danger (thereby impeding people's affiliation motivations: Leary & Baumeister, 2000), I propose that running in the background of people's assessments of possible change is a monitoring system that attempts to gauge the impact of the change on their immediate situation and how they would need to alter their immediate behavior if the change is real (thereby impeding people's stasis motivations). The system should therefore be sensitive to a person's perceived abilities to effectively respond to that impact at the time of judgment. As such, it should operate continuously (or at least mostly continuously) and be informed by both automatic and deliberate informational feedback. People's actual change judgment may also be either automatic or deliberate, or a mix of both (i.e., people may or may not have some degree of awareness that their judgment of a change threshold is at least partly influenced by their perceived disruption costs). I return to this issue of people's awareness of their accounting of disruption costs (and how awareness vs. lack of awareness bears on other aspects of the judgment process) in Section 3.

Because the system runs throughout the judgment process and information processing, it should also wield bidirectional influence on both

stage 1 (attention) and stage 2 (evaluation). This feedback cycle is represented by the dotted upward arrows in Fig. 2. For example, when the system is activated, people's high concerns about disruption costs might lead to them to selectively shift their attention toward certain kinds of stimuli signals and away from other kinds (e.g., they may prioritize confirming signals over disconfirming signals, depending on their available resources to respond if the change is indeed confirmed: Kahan et al., 2012; Luo & Zhao, 2019). The final output—people's change perception, having crossed the threshold—filters through this 3-way interaction between attention, evaluation, and behavioral monitoring.

2.3 When, and in what ways, does monitoring for disruption costs create flexible thresholds?

According to my theorizing thus far, although such a monitoring system may run in the background of judgment, people should nonetheless become more (vs. less) likely to account for disruption costs in their change perceptions to the extent that they bring to mind the need to respond to a given change to begin with, such that a higher (vs. lower) perceived need to respond should increase (vs. decrease) people's consideration of disruption costs. It follows, then, that people will not always consider disruption costs at the time of judging change, which is theoretically consistent with an account of functional monitoring. If people do not bring to mind a need to respond to the change begin with, then my theorizing suggests that people will simply rely on the basic stages of information processing—the salience of the evidence for change (stage 1, attention) and the quality of that evidence (stage 2, evaluation)—to form their judgment. This essentially reverts to a change-perception process that is more conceptually akin to Fig. 1 (traditional account) than to Fig. 2 (flexible thresholds). For example, when people evaluate potential changes that they deem entirely irrelevant or unrelated to any current goal, this system should be less engaged—such as perhaps when people complete extremely basic laboratory tasks or when they judge targets that are completely removed from their own personal present interests (e.g., consider the psychological difference between participants who are tasked with judging whether their own current health is failing vs. whether a stranger's health from centuries ago had been failing them at the time, in response to participants being given the same diary information about the target's daily ups-and-downs).

However, such cases likely represent the exception rather than the rule. In more common settings in everyday life, people rarely respond neutrally

to signs of possible change in their environment (Nesse & Ellsworth, 2009; Zajonc, 1980) and commonly envisage themselves as actors in the events that they observe unfold around them (e.g., "personalism": Jones & Davis, 1965). When people feel personally implicated by the occurrence of an event, they tend to respond and engage with it rather ignore it (e.g., as in research on "positive" bystander effects: Cramer, McMaster, Bartell, & Dragna, 1988; Fischer et al., 2011).

Thus: When people perceive a need to respond to a potential change in the first place, which likely is often, I propose that they will be prompted to consult the monitor and consider disruption costs. In turn, their perceptions that disruption costs are high vs. low determine the way in which their threshold judgments will be influenced. Fig. 3 zooms in on this process.

2.3.1 Variables that increase (vs. decrease) people's need to respond, and thus prompt (vs. not prompt) people's considerations of disruption costs

As reviewed, the behavioral monitoring system should not always be consulted when people encounter stimulus signals of potential change. If people deem no need to respond in the first place ("No" box in Fig. 3), the model posits that they can default to relying on informational salience and informational quality (reverting to the traditional model presented in Fig. 1). However, if people indeed deem a need to respond ("Yes" box in Fig. 3), then the behavioral monitoring system is consulted.

What are the variables that influence "No" vs. "Yes" responses? Some primary (but non-exhaustive) candidate possibilities are (i) people's personal involvement with the potential change at hand, (ii) people's understanding of broader norms or expectations for responding, and (iii) the general stakes or urgency of responding.

Regarding personal involvement, people should presumably feel a greater need to respond to a change that might directly bear on themselves in some way. This is consistent with the aforementioned research on "positive" bystander effects. A meta-analysis (Fischer et al., 2011) found that the more personally implicated people felt when caught in a situation of need (e.g., because they were or perceived themselves to be more competent about how to help effectively—as found, for instance, in comparing nurses' responses vs. laypeoples' responses to a sudden medical emergency), the more likely they were to indeed respond (thus attenuating the diffusion of responsibility). By a similar logic, people who are

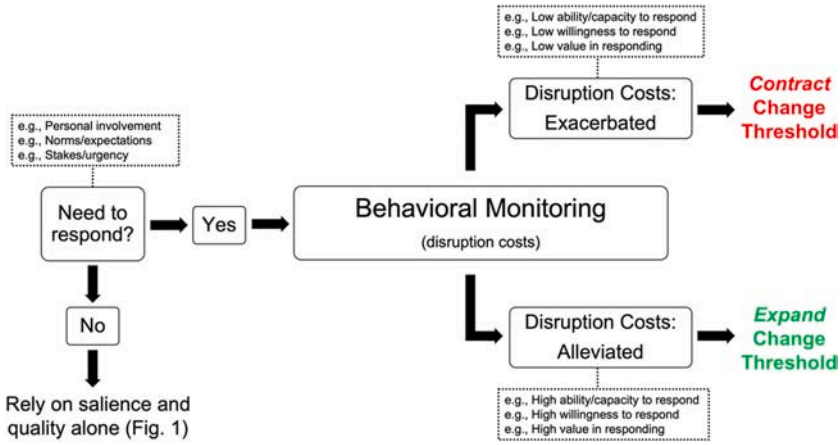

Fig. 3 Zooming in to model the process of people's monitoring of disruption costs. First, people encounter stimulus signals of potential change and judge their need to respond to them. Answers of "no" lead people to evaluate those signals based on salience and quality, putting them into the traditional model of how people judge change thresholds (as shown in Fig. 1). Answers of "yes" lead people to consult the monitoring system for perceived disruption costs. Exacerbated disruption costs promote contraction of change thresholds (meaning that people are slower and less open to concluding things have changed); alleviated disruption costs promote expansion of change thresholds (meaning that people are quicker and more open to concluding things have changed). All dotted boxes across the figure represent proposed moderators at the indicated stage.

psychologically closer (vs. more distant) toward an event (Trope & Liberman, 2010) should feel more involved and thus be more likely to feel the need to respond.

Regarding broader norms or expectations, people should presumably feel a greater need to respond to a change when they feel like they ought to respond to it. This could be due to more general societal norms (e.g., cultural differences in what counts as a social violation warranting the response of punishment) and/or individual expectations otherwise (e.g., peer pressures to respond in the way that one believes one's group expects one to respond: Mu, Kitayama, Han, & Gelfand, 2015).

Regarding general stakes or urgency, a straightforward assumption that follows is that the higher (vs. lower) the perceived stakes or urgency of an event should generally prompt stronger (vs. weaker) motivations to take action to respond to that event if it indeed seems about to occur (see also Jones, 1991; who makes a similar point in the context of responses to moral dilemmas).

2.3.2 Variables that exacerbate perceived disruption costs, and thus lead people to contract their change thresholds

Once consulting the behavioral monitoring system, people will be prompted to consider their current state of disruption costs. Some variables might *exacerbate* perceived disruption costs (upward arrow, Fig. 3) relative to people's typical baseline or expectations otherwise—and, as a result, this should compel people to *contract* their change thresholds all else equal. This means that people should become slower and less open to concluding things have changed—and hence should become less likely to take action—even going beyond salience and quality alone. This proposition can uniquely explain why people sometimes deny change in the face of highly salient and high-quality signals (for various examples and a more detailed discussion of this proposition, see Section 3).

What are the variables that promote exacerbation? Some primary (but non-exhaustive) candidate possibilities are (i) people having a low ability or capacity to respond to the potential change at hand, (ii) people having a low willingness to respond to the potential change at hand, and (iii) people otherwise believing that there is low value to responding to such a change.

Regarding low abilities or capacities, research has shown that restrictions to one's current resources (whether in terms of restrictions to our cognitive or psychological resources, time, energy, behaviors, and so on) can lead people to grow inward and deprioritize the distribution of those limited resources to tasks they do not need to immediately complete (e.g., Loewenstein, 1996; Mullainathan & Shafir, 2013; Perlow, 1999). In a similar vein, low perceived competence in a domain is found to predict low participation and response rates within that domain (Cheryan, Ziegler, Montoya, & Jiang, 2017; Fischer et al., 2011). Similar tendencies are reflected in people who have a low willingness to respond (e.g., people are less willing to invest their time and effort into trying to address fixing seemingly-unfixable problems: Brown & Inouye, 1978) and who perceive low value in responding to begin with (e.g., people are less likely to engage with problems that they themselves do not view as particularly problematic, even if they know that others facing those problems indeed view them as problematic: Wondra & Ellsworth, 2015).

Consistent with an account of functional monitoring, such variables should feed into people's calculations of disruption costs, whereby the lower people's beliefs are regarding these dimensions (i.e., lower perceived abilities/capacities; lower perceived willingness; lower perceived value), perceived disruption costs should be exacerbated (i.e., disruption costs

should seem *more* disruptive as compared to how they had seemed from the judge's baseline state)—promoting people to contract their change thresholds and thereby become less likely to acknowledge the change.

2.3.3 Variables that alleviate perceived disruption costs, and thus lead people to expand their change thresholds

In contrast, other times when people consult the behavioral monitoring system and thus are prompted to consider their current state of disruption costs, other variables might *alleviate* perceived disruption costs (downward arrow, Fig. 3) relative to people's typical baseline or expectations otherwise—and, as a result, this should compel people to *expand* their change thresholds all else equal. This means that people should become quicker and more open to concluding things have changed—and hence should become more likely to take action—even going beyond salience and quality alone. This proposition can uniquely explain why people indeed sometimes believe that change has occurred in the face of lowly salient and low-quality signals (for various examples and a more detailed discussion of this proposition, see Section 3).

What are the variables that promote alleviation? The logic here could simply be viewed as the converse as the logic that was put forth in discussing the variables that might promote exacerbation: Some primary (but non-exhaustive) candidate possibilities are (i) people having a high ability or capacity to respond to the potential change at hand, (ii) people having a high willingness to respond to the potential change at hand, and (iii) people otherwise believing that there is high value to responding to such a change.

Indeed, when people feel like they can respond to an event effectively (e.g., because they have less restricted resources, high perceived competence in the domain, and so forth), when people are highly willing to respond to an event (e.g., because it seems worthwhile to address), and when people view a response as otherwise highly valuable (e.g., because they deem it to be valuable for them personally), one should expect the converse effects to follow. To add here, for example, people with ample or surplus resources (e.g., long time horizons: Liao & Carstensen, 2018) and people who receive a surprise windfall of resources (e.g., found time: Chung, Lee, Lehmann, & Tsai, 2023; Tonietto & Malkoc, 2016) have been shown to be more open to pursuing and engaging with new experiences.

Again, consistent with an account of functional monitoring, such variables should feed into people's calculations of disruption costs, whereby the higher people's beliefs are regarding these dimensions (i.e., higher

perceived abilities/capacities; higher perceived willingness; higher perceived value), perceived disruption costs should be alleviated (i.e., disruption costs should seem *less* disruptive as compared to how they seem from the judge's baseline state)—promoting people to expand their change thresholds and thereby become more likely to acknowledge the change.

Further adding to these ideas, research on individual differences on problem-solving (see Section 3 for further discussion of individual differences) finds that people who possess an internal vs. external locus of control tend to be more likely to take up remedial efforts to fix personal problems (Gore & Rotter, 1963; Phares, Ritchie, & Davis, 1968), as are people who endorse incremental vs. entity mindsets (Hong, Chiu, Dweck, Lin, & Wan, 1999). Relatedly, when people witness others pursue and achieve self-improvement goals, this can sometimes spur them to do the same by reducing their own self-efficacy concerns for making self-improvement happen (Sparkman & Walton, 2019). These findings can be more generally understood as reflecting the role of perceived disruption costs proposed here. People appear to be more open to recognizing declines when they feel equipped to address them—or, as put in current terms, when their perceived disruption costs are alleviated.

2.3.4 Person-based and situation-based inputs

Finally, note that any of these variables can be influenced by either person-based inputs (e.g., stable personality traits; demographic differences) or situation-based inputs (e.g., forming judgments in a more transient state; cultural differences). The theory can accommodate both kinds of sources and makes the same predictions either way.

A similar assumption is made in, for instance, research on people's detection of the "just-noticeable difference" in basic sensory perception (operationally defined as the smallest level of stimulus change that a person is able to detect at least 50% of the time during a pre-set presentation window: Levine & Shefner, 1981), with Signal Detection Theory (SDT) positing that this inflection point is not absolute and instead depends on contextual factors (for a review, see Wixted, 2020); as (Wixted, 2020, p. 202) summarizes, "…the concept of the just-noticeable difference is a moving target." The same goes for the concept of change thresholds as presented in the current chapter. Any input into any variable that *exacerbates* people's perceived disruption costs at the time of judgment should lead people to *contract* their judged change thresholds; any input into any variable that *alleviates* people's perceived disruption costs at the time of judgment should lead people to *expand* their judged change thresholds.

3. Predictions, evidence, contributions, and applications of flexible threshold theory

Next, I use flexible threshold theory to generate novel predictions and applications. I begin by reviewing some primary predictions and drawing supporting evidence from my own laboratory, and then I transition to new questions, applications, and directions for future research as drawn from across the field. Throughout, I highlight unique contributions of the theory in helping to re-explain and resolve conundrums in the literature and in everyday life.

3.1 Predictions and evidence

3.1.1 Flexible thresholds in judging improvements vs. declines

One prediction following from this proposed model is a valence asymmetry in judging change thresholds: All else equal, and holding informational salience and informational quality otherwise constant, people should expand their thresholds for judging official decline but contract their judgments for judging official improvement. That is, people should be quicker to diagnose things getting worse vs. things getting better, given the same evidence for change either way.

According to the theory, this occurs because knowing that one is responding to decline vs. improvement should alleviate perceived disruption costs (all else equal). When people calculate whether or not to judge a change as officially occurring, the perceived disruption to their immediate behavior as caused by recognizing the change should strike them as more worthwhile if they are responding to bad change vs. good change—because recognizing decline might help stop further problems down the road. That is, people should generally have a higher willingness to respond, and view a higher value in responding, to potential declines (vs. improvements), again all else equal (e.g., assuming a similarly high ability or capacity to respond in both cases)—and thus people should expand (vs. contract) their change thresholds.

To date, we have now found consistent support for this prediction across many contexts (e.g., Klein & O'Brien, 2016; O'Brien & Klein, 2017; O'Brien, 2020; O'Brien, 2022a; 2022b). For example, in one series of experiments (O'Brien & Klein, 2017; Experiments 1a–1b–1c), participants read about the change-trajectories of different experiences over time and reported the amount of evidence that they demanded before deeming the change to have officially occurred (as opposed to these change-

trajectories reflecting a more passing fluke or natural fluctuations). In within-subjects fashion, all participants evaluated 8 different domains one at a time in random order: They tracked changes in a person's athletic performance, academic performance, health, mood, luck, habits, quality of friendships, and personality traits. In between-subjects fashion, participants were randomly assigned to Decline vs. Improvement conditions (and they stayed in their same assigned condition across making all 8 within-subject judgments). Participants in the Decline condition read about targets who started at positive points but began showing signs of negative change. Participants in the Improvement condition read about targets who started at equivalent negative points but began showing signs of equivalent positive change. For example, for the "health" domain, participants in the Decline condition were asked to indicate how many observations of the next 10 observations must a healthy person exhibit unhealthy tendencies to signal the start of official decline; participants in the Improvement condition were asked to indicate how many observations of the next 10 observations must an unhealthy person exhibit healthy tendencies to signal the start of official improvement. Note that the salience and quality of the evidence here is otherwise designed to be identical across valence conditions, as explicitly stated in the study prompts. Finally, for further generalizability across measures, participants either made these judgments via frequency-based changes (Experiment 1a: e.g., "How many observations of the next 10 must be healthy…", as rated from 1 observation to 10 observations), duration-based changes (Experiment 1b: e.g., "For how long must they be healthy…", as rated from 1 = *just a short time* to 10 = *a long time*), or magnitude-based changes (Experiment 1c: e.g., "How much healthier must they be…", as rated from 1 = *10% healthier* to 10 = *100% healthier*). Table 1 shows the results. As can be seen, there is a highly consistent asymmetry across domains and measurement types: All else equal, people are quicker to judge official declines than they are to judge official improvements.

To take another example, participants in a follow-up experiment (O'Brien & Klein, 2017; Experiment 2) were all shown the exact same evidence for change—literally. All participants viewed the same chart of economic change in the United States over the past few decades, spanning the 1950s through the 2000s, as measured via the "Economic Volume Index." Unbeknownst to participants, we designed this metric and the stimulus ourselves, such that the chart depicted a somewhat ambiguously changing trendline (see Fig. 4 for the stimulus).

Table 1 People's thresholds for judging change, as judged across a variety of life domains (within-subjects) and the kind of change being judged (Decline vs. Improvement, between-subjects). Means and standard deviations are presented. Higher numbers indicate higher thresholds (1–10 Likert scales). Means sharing lower-case subscripts significantly differ at $p < 0.01$; means sharing upper-case subscripts significantly differ between $p = 0.01$ and 0.05.

	Experiment 1a: Frequency of change		**Experiment 1b: Duration of change**		**Experiment 1c: Magnitude of change**	
	Decline	Improvement	Decline	Improvement	Decline	Improvement
1. Athletic	5.37_{a} (1.88)	6.08_{a} (2.04)	5.93 (2.13)	6.38 (2.07)	4.82_{m} (2.13)	5.60_{m} (2.27)
2. Academic	5.29_{b} (2.23)	6.27_{b} (2.06)	5.78_{A} (2.26)	6.33_{A} (2.20)	4.08_{n} (1.92)	6.25_{n} (2.07)
3. Health	5.44_{c} (2.16)	6.64_{c} (2.06)	5.34_{i} (2.17)	7.02_{i} (2.20)	4.80_{o} (2.03)	5.58_{o} (2.40)
4. Mood	5.73_{d} (2.44)	6.55_{d} (2.33)	5.94_{B} (2.22)	6.57_{B} (2.08)	5.32_{D} (2.13)	5.95_{D} (2.16)
5. Luck	5.03_{e} (2.43)	6.68_{e} (2.24)	4.81_{j} (2.62)	7.30_{j} (2.68)	4.79_{p} (2.44)	6.01_{p} (2.62)
6. Habits	6.30_{f} (2.43)	7.21_{f} (1.97)	5.82_{C} (2.05)	6.51_{C} (2.31)	4.52_{q} (1.91)	5.64_{q} (1.97)
7. Friendship	4.13_{g} (1.89)	6.19_{g} (2.29)	4.75_{k} (2.26)	6.51_{k} (2.24)	4.73_{r} (1.88)	6.00_{r} (2.28)
8. Personality	4.87_{h} (2.31)	6.66_{h} (2.63)	6.49_{l} (2.22)	7.92_{l} (1.86)	5.06_{s} (1.84)	5.85_{s} (2.36)

Source: Adapted from: O'Brien, E., Klein, N. (2017). The tipping point of perceived change: Asymmetric thresholds in diagnosing improvement versus decline. *Journal of Personality and Social Psychology, 112*, 161–185, Experiments 1a–1b–1c.

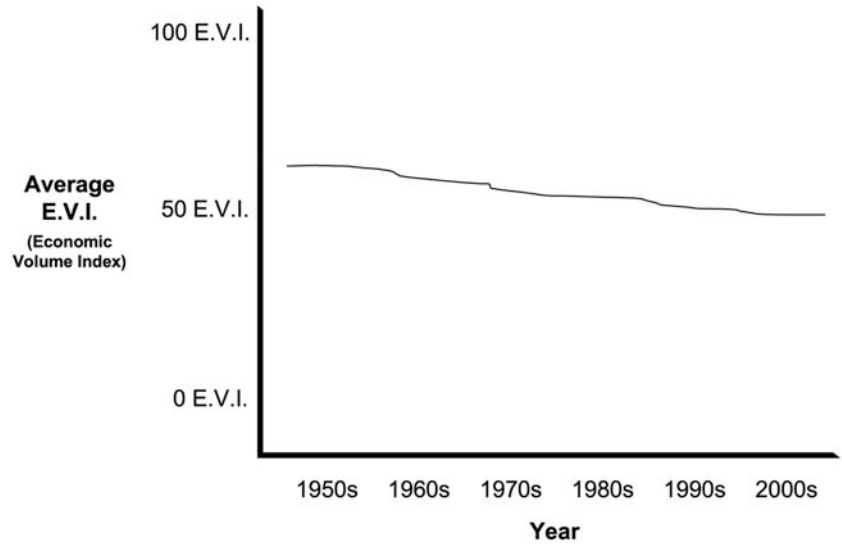

Fig. 4 Chart depicting ambiguous change over time. Based on random assignment (between-subjects), participants were informed that lower numbers on this alleged metric are suggestive of decline or that lower numbers on this alleged metric are suggestive of improvement. Their task was to judge whether the change shown here represented a meaningful and lasting trend (or not). *Adapted from: O'Brien, E., & Klein, N. (2017). The tipping point of perceived change: Asymmetric thresholds in diagnosing improvement versus decline. Journal of Personality and Social Psychology, 112, 161–185, Experiment 2.*

Participants' task was to indicate their beliefs that the change occurring on this specific metric of the economy was indeed meaningful and lasting (e.g., they rated the extent to which it showed "a clear trend rather than just noise," as rated from 1 = *definitely no* to 10 = *definitely yes*). We made clear that they should strictly assess this unique subset of the economy (as opposed to, e.g., drawing on their knowledge about the economy more generally, which we clarified was distinct). Despite staring at identical evidence, participants interpreted the chart differently depending on which between-subjects condition to which we assigned them. Participants in the Decline condition, who were told that lower values suggest things are getting worse on this dimension, rated the change as more meaningful and lasting than participants in the Improvement condition, who were told that lower values suggest things are getting better on this dimension. Moreover, this effect generalized across other relevant parameters—such as when we flipped the slope of the line (upward vs. downward) and when we changed

domains (e.g., to the "Health Volume Index" referring to changes in public health, as opposed to changes in the economy). Throughout, the critical psychological lever for judging official change was whether people thought that these exact same signs of change signaled potential decline vs. improvement.

Following this same theoretical rationale, this valence asymmetry should flip in the other direction—such that people contract (vs. expand) their change thresholds for judging decline (vs. improvement)—when the disruption costs for judging decline are exacerbated rather than alleviated. This is indeed what we have found. In one experiment (O'Brien & Klein, 2017; Experiment 6), for example, we randomly assigned participants to a Decline condition, whereby they evaluated a series of 10 bad performance attempts by a performer, or to an Improvement condition, whereby they evaluated a series of 10 good performance attempts by a performer. They viewed the outcomes of these attempts one-by-one by freely clicking screen-by-screen to reveal them (e.g., "Attempt #1: Good…"; click to next screen; "Attempt #2: Good…"; and so on). Participants were tasked with stopping at the point when they had officially crossed their change threshold—such that they believed the good performer was officially on the right track (i.e., that they indeed possess the skill; improvement threshold) or that they believed the bad performer was officially on the wrong track (i.e., that they lack the skill; decline threshold).

We further randomly assigned participants to 1 of 3 framing conditions: Control vs. Decline-Likely vs. Decline-Unlikely. Control participants were told nothing else. Participants in the Decline-Likely condition were told that decline is extremely likely to occur in this performance domain, such that the base-rates suggest most novice performers neither improve nor develop the skill regardless of any early signs of how well they perform. Participants in the Decline-Unlikely condition were told that decline is extremely unlikely to occur in this performance domain, such that the base-rates suggest most novice performers end up improving and indeed developing the skill even if they show early signs of a lack of progress. Across all of these conditions, we simply assessed the number of observations that participants freely collected before they crossed their change thresholds. Fig. 5 shows the results.

As can be seen, participants in the Control condition and participants in the Decline-Likely condition showed the standard valence asymmetry, such that they were quicker to judge decline vs. improvement. Critically, however, this effect flipped among participants in the Decline-Unlikely

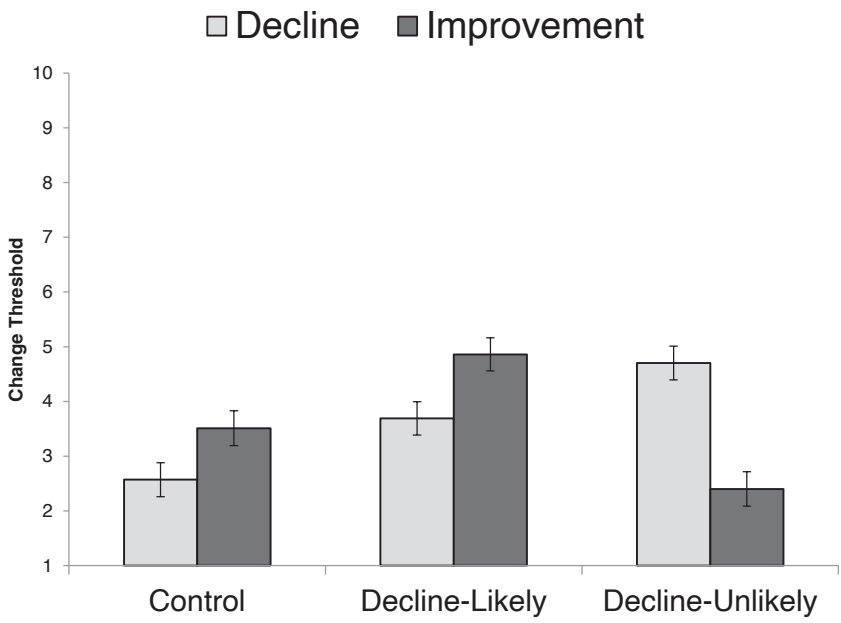

Fig. 5 People's thresholds for judging change, as judged across the kind of change being judged (Decline vs. Improvement, between-subjects) and the context of the change being judged (Control vs. Decline-Likely vs. Decline-Unlikely, between-subjects). Means and ±1 standard error are presented. The y-axis shows the number of pieces of evidence for change (1–10 pieces) that participants freely collected before judging change to have occurred. Thus, higher numbers indicate higher thresholds. Non-overlapping error bars indicate a significant difference at $p < 0.05$. *Adapted from: O'Brien, E., & Klein, N. (2017). The tipping point of perceived change: Asymmetric thresholds in diagnosing improvement versus decline. Journal of Personality and Social Psychology, 112, 161–185, Experiment 6.*

condition, who became *slower* to judge decline vs. improvement. Why? One reason is because jumping to conclude decline-that-seems-unlikely poses increased disruption costs (e.g., now having to invest effort into managing a false alarm). There is less value to diagnosing change here and thus people were less likely to do it.

Finally, in other research from my laboratory, we have tested and found support for at least three other predictions that also follow from this dimension of valence as it bears on the current model. First, people are especially sensitive to declines within social and moral domains that might more directly affect them and their relationships (e.g., Klein & O'Brien, 2016; note also that, in Table 1, the "friendship" means tend to skew lowest of all in terms of demanded evidence for decline). Second, people

are especially sensitive to declines when they believe improvement is right around the corner (vs. far-off or even non-existent: Li, Hsee, & O'Brien, 2023; O'Brien, 2022a). Third, when evaluating declines that have already indeed occurred, people invest less effort into carefully evaluating them as compared to how they treat equivalent improvements that have already indeed occurred (O'Brien, 2022b). All three of these findings are consistent with a functional monitoring account revolving around perceived disruption costs: When judgments of decline promise higher value (the social/moral findings), and when people are more equipped to handle decline (the right-around-the-corner findings), these factors should alleviate perceived disruption costs and thus lead people to be more open to acknowledging decline (and indeed they are); likewise, to the extent that perceived disruption costs are higher at the prospect of having to sort through already-declined entities (that may seem to offer little value in one's present) vs. already-improved entities (that may seem to offer more value in one's present), people are quicker to ignore those already-failed (vs. already-improved) entities.

3.1.2 Flexible thresholds in judging self-change vs. other-change

Another prediction following from this proposed model is a predictable self/other asymmetry in judging change thresholds, in particular ways. All else equal, and holding informational salience and informational quality otherwise constant, people should contract vs. expand their thresholds differently when judging certain kinds of change in themselves vs. change in others—assuming that perceived disruption costs should generally be higher when people themselves are personally implicated in such change. For example, all else equal, one might expect that people should tend to be slower to judge official decline in themselves vs. in others—and indeed this is what we have found across a variety of judgment contexts (e.g., Kardas & O'Brien, 2018; Klein & O'Brien, 2017; O'Brien & Kardas, 2016; O'Brien, 2013; O'Brien, 2015a; 2015b; O'Brien, Ellsworth, & Schwarz, 2012; Wald & O'Brien, 2022).

In one experiment (O'Brien & Kardas, 2016; Experiment 5), participants completed a speeded-response task (similar to the IAT [implicit association test]: Greenwald et al., 1998) involving seeing a word (e.g., "stress") and responding as quickly as they could once they categorized that stated concept as positive or negative. Based on random assignment (between-subjects), participants were instructed to imagine each word as it related to themselves (e.g., imagining one's own stress) vs. as it related to a friend (e.g., imagining a friend's stress). All participants completed

numerous trials of this task involving different words. The critical trial was the presentation of the word "change." The key finding was that participants intuitively categorized change as positive when it was in relation to themselves, but as negative when it was in relation to a friend.

In another experiment (O'Brien, 2013; Experiment 4), participants completed a task involving bringing to mind possible declines in the future (e.g., the thought of growing less satisfied with one's life in the coming future). They rated two key variables: how easy it felt to bring to mind and simulate these declines, and how "real" they thought the declines would be (i.e., their perceived likelihood of those declines actually occurring). The classic finding in the literature is a positive correlation between these variables akin to a "fluency" effect, such that the easier it feels to imagine a target, the truer and more believable the target seems (for a review, see Schwarz, 2004). However, consistent with the model presented in the current chapter, this is not the full case when people imagine future declining change—instead, it depends on *who* people think about. Based on random assignment (between-subjects), participants completed this task in relation to thinking about their own possible decline in the future vs. a friend's possible decline in the future. The first result showed that that participants indeed exhibited the classic fluency effect when thinking about a friend, such that the easier it was to imagine future decline for their friend, the more that participants thought their friend would actually experience that decline. The second result showed that participants did *not* exhibit this effect when thinking about themselves: Despite reporting that it felt easy and fluent to imagine future decline for themselves, these participants became no more likely to cross that threshold and believe future decline would actually occur for themselves.

In another experiment (Klein & O'Brien, 2017; Experiment 4), participants completed a task involving reflecting on potential improvements over time, and rating the extent to which they felt inspired by that change (thus serving as a proxy for people's change threshold, such that it assumes an acknowledgment that the change had officially occurred and was meaningful). Based on random assignment (between-subjects), participants completed this task in relation to themselves vs. others. Specifically, for "self" participants, they wrote out their reflections via a short essay and then rated their inspiration toward that described change; for "other" participants, we showed those same essays to naïve others who then made these same ratings (via a yoked design, such that each "other" participant rated one essay, as randomly selected without replacement from our pool of

"self" essays). The results showed that participants were more inspired by their own improvements as compared to how others rated those same experiences. This finding suggests that people are more likely to cross a change threshold when evaluating their own positive change vs. others' positive change, consistent with the model presented in the current chapter. Providing further consistent evidence, another experiment (O'Brien, 2015a; Experiment 2) found that participants generally believed positive change was more likely to occur for themselves than for a friend.

Finally, a series of experiments conducted in the context of skilled performance and changes in ability assessments (Kardas & O'Brien, 2018; Wald & O'Brien, 2022) further illustrates the self-other asymmetry theorized here. A representative example is Experiment 7 from Wald and O'Brien (2022). In this experiment, participants completed a task involving judging a person's attempt at copying an expert drawing, and as it turned out, the person ended up not copying the drawing very well. The primary hypothesis that we tested was whether participants who first repeatedly (vs. sparsely) watched an instructional video for how to copy the drawing might become harsher in their criticism of then observing another person's poor attempt, such that overexposure to success might make the task seem easy and thus harshen reactions to failure. Indeed, this is what we found: Participants who watched the instructional video 20 times repeatedly vs. watched just once (based on random assignment, between-subjects) were harsher to criticize another person's poor attempt—akin to crossing a change threshold ("This person is officially bad at the task"). Critically, however, participants did not show this effect to the same degree when they judged *themselves* and *their own* equally poor attempt (as also based on random assignment, between-subjects; a "judge-self" condition vs. a "judge-other" condition). In fact, this "judge-self" condition was drawn from participants' own reactions to these exact same poor attempts as the subjects themselves. Fig. 6 shows the results.

As can be seen, crossing a change threshold for decline was less likely to occur among participants who inferred ample (vs. little) evidence of their own failures vs. ample (vs. little) evidence of someone else's equivalent failures on the same task. It is as if participants explained away their own failures as a passing fluke (thereby leading them to contract their change thresholds) as opposed to concluding that it reflected official decline (thereby leading them to expand their change thresholds), despite doing the latter and taking that exact same evidence indeed as a sign of official decline simply when it occurred for someone else.

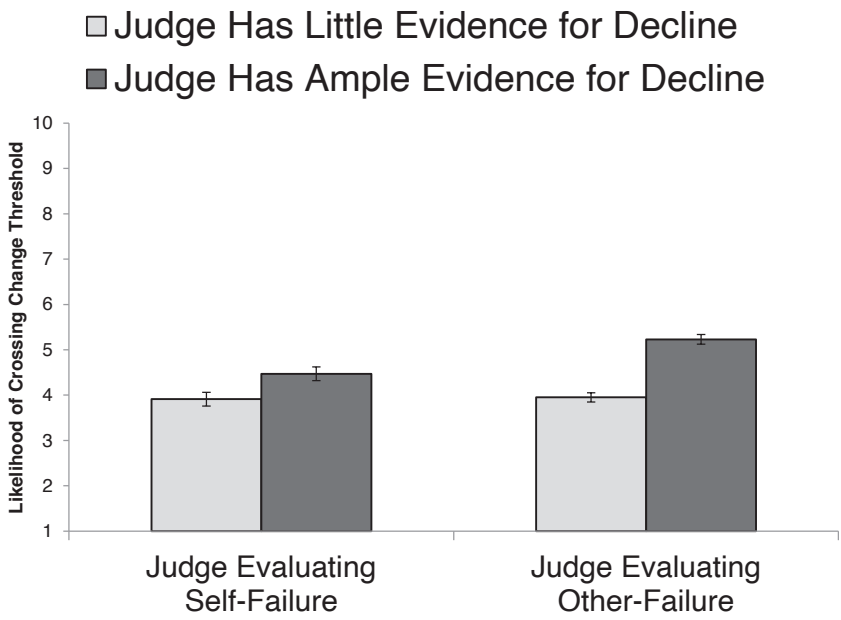

Fig. 6 People's likelihood of crossing their thresholds for judging change in response to the same signs of decline, as judged across the perceived evidence for change (Watch 1×, little evidence for decline vs. Watch 20×, ample evidence for decline; between-subjects) and the target of the change being judged (Self vs. Other, between-subjects). Means and ±1 standard error are presented. Higher numbers indicate a greater likelihood of crossing the change threshold (1–10 Likert scale). Non-overlapping error bars indicate a significant difference at $p < 0.05$. *Adapted from: Wald, K.A., & O'Brien, E. (2022). Repeated exposure to success harshens reactions to failure. Journal of Experimental Social Psychology, 103, 104381, Experiment 7.*

3.1.3 Flexible thresholds in imagining potential change in the abstract vs. responding to actual change in real time

Another prediction following from this proposed model is a predictable asymmetry in how people imagine judging change thresholds vs. how people actually judge thresholds, in particular ways. All else equal, and holding informational salience and informational quality otherwise constant, people should contract vs. expand their thresholds differently when imagining change vs. experiencing change—to the extent that perceived disruption costs seem different in one's imagination beforehand as compared to how they end up playing out when such change is actually unfolding.

This is indeed what we have found (e.g., Klein & O'Brien, 2018; Klein & O'Brien, 2023; O'Brien, 2020). In a typical study in this line of research, participants indicate their change thresholds at two time points, in within-subjects fashion: once before the relevant events unfold (i.e., participants first indicate their imagined change threshold) and then again as those relevant events indeed unfold (i.e., participants then indicate their actual change threshold). From a rational-actor perspective, people's imagined thresholds should simply match their actual thresholds, assuming that people form these judgments based on the same information at both time points. However, we have found that the reality of this assumption depends on people's differential construal of disruption costs over time—which can seem either alleviated in real time as compared to what people had imagined beforehand and therefore lead to a "quicker to judge" effect (such that people become more likely to diagnose change than they thought they would be; their change thresholds become expanded over time), or can seem exacerbated in real time as compared to what people had imagined beforehand and therefore lead to a "slower to judge" effect (such that people become less likely to diagnose change than they thought they would be; their change thresholds become contracted over time).

A representative example is Experiment 4 from Klein and O'Brien (2023). In this experiment, participants completed a task involving setting a threshold for rewarding a worker based on the number of times that the worker showed up early to work—thereby marking participants' change threshold for when they would officially take action. First, we described all the ways the worker could show up early, ranging from clearly-good ways (e.g., showing up early with strong passion) to more ambiguously-good ways (e.g., showing up early but with a disrespectful or feigning attitude). We explicitly instructed participants to imagine that any of these ways was equally likely to occur, each time the worker showed up early. Based on this, we then administered our key dependent variable: We told participants to imagine that the worker showed up early for 5 of the next 10 work sessions, and we asked them to report whether they thought that this should mark the threshold for rewarding the worker (again keeping in mind that each of these 5 early arrivals could occur in any of those clearly-good ways vs. ambiguously-good ways). Participants chose from "yes" vs. "no," such that a response of "yes" indicates the crossing of their change threshold. This served as their Time 1 response. Next, we then revealed how the worker actually did, such that the worker indeed showed up early to 5 of those 10 work sessions as they played out—at which point we then

re-asked participants the same "yes"/"no" question about rewarding the worker. This served as their Time 2 response. Of critical interest, we randomly assigned participants to one of two conditions (between-subjects) at Time 2, such that some participants learned that all 5 of these early arrivals were in the "clearly-good" category of early arrivals whereas other participants learned that all 5 of these early arrivals were in the "ambiguously-good" category of early arrivals.

Note the key test: If participants had indicated "yes" to hitting their threshold at Time 1, then they should also simply indicate "yes" to hitting their threshold at Time 2—because the information is identical at both time points. This is true for either condition, because in both cases, the worker at Time 2 still qualifies for one's Time 1 threshold. In principle, the manipulation of clarity vs. ambiguity should matter the same to participants at Time 2 as it did at Time 1. In practice, however, we hypothesized that a clearly-good reality would reduce perceived disruption costs for acknowledging positive change and thus increase "yes"-responses, while an ambiguously-good reality would increase perceived disruption costs for acknowledging positive change and thus decrease "yes"-responses. In the abstract, imagining any one of these specific realities is diluted by having to imagine them along with any number of other specific realities that could play out. In real time, however, each of them stands out in isolation.

As a final component of the experimental design, we also conducted all of the procedures above, with the same hypothesis and so forth, except in the negative domain—with participants reporting their thresholds for punishing a worker based on 5 of 10 late arrivals, each of which played out in clearly-bad ways (e.g., showing up late with brazen rudeness) or in ambiguously-bad ways (e.g., showing up late but with a respectful and reasonable attitude). Fig. 7 shows the results.

As can be seen, for both rewards and punishments alike, people violated their own pre-judged change thresholds depending on what played out in reality—despite all such possible realities having been on the table all along. Consistent with the model presented in the current chapter, a "quicker to judge" effect emerged (i.e., more participants ended up crossing their change threshold than they had stated beforehand) when the reality that played out provided clear evidence of positive change or negative change, whereas a "slower to judge" effect emerged (i.e., fewer participants ended up crossing their change threshold than they had stated beforehand) when the reality that played out provided ambiguous evidence of positive change or negative change. Put in terms of disruption costs, clear evidence of

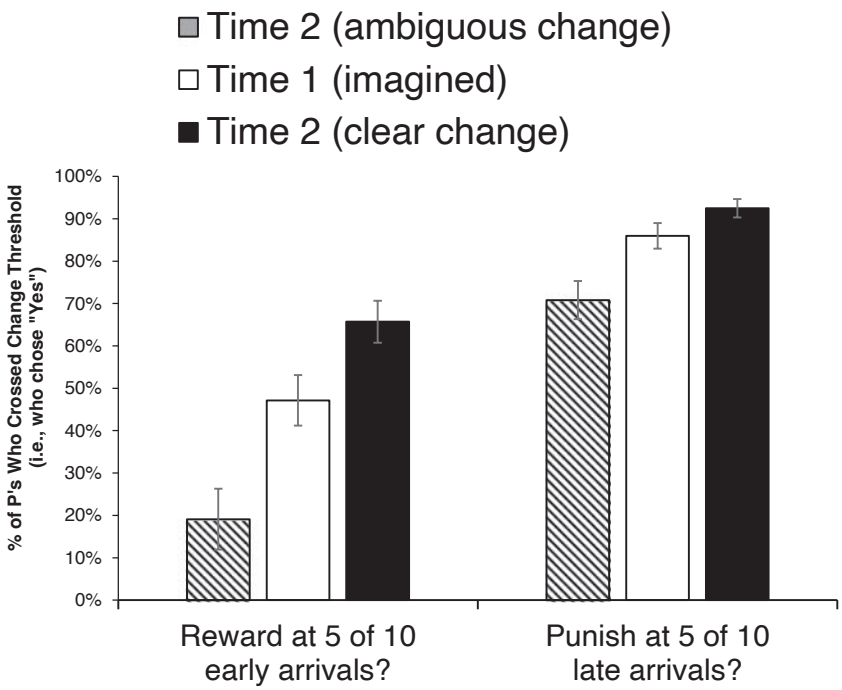

Fig. 7 The percentage of participants who said "yes" vs. "no" to crossing their change threshold in response to otherwise identical evidence for change, as judged across imagination vs. experience (within-subjects). Percentages and ±1 standard error are presented. Non-overlapping error bars indicate a significant difference at $p < 0.05$. *Adapted from: Klein, N., & O'Brien, E. (2023). Threshold violations in social judgment. Journal of Personality and Social Psychology, Experiment 4.*

change should alleviate perceived disruption costs to acknowledging it whereas ambiguous evidence of change should exacerbate those perceived disruption costs—thus producing each of these effects as we indeed found them.

Finally, a series of experiments conducted in the context of people's pursuit of enjoyment and well-being (Kardas, Schroeder, & O'Brien, 2022; O'Brien & Kassirer, 2019; O'Brien & Roney, 2017; O'Brien & Smith, 2019; O'Brien, 2021; O'Brien, Kristal, Ellsworth, & Schwarz, 2018; O'Brien, 2019) further illustrates this theorized imagined-vs.-actual asymmetry. For example, to the extent that imagined enjoyment tends to be less hedonically powerful and immersive than real-time enjoyment (O'Brien & Roney, 2017), then people might tend to hit their change threshold prematurely in such contexts—such that they believe an

enjoyable experience has officially run its course when in fact it has not. We have tested and found consistent support for this idea across a wide variety of repeat-experience contexts, ranging from the surprising novelty left remaining in self-oriented experiences such as re-watching movies and revisiting museums (e.g. O'Brien, 2019) to the surprising novelty left remaining in other-oriented experiences such as having prolonged conversations with others (e.g., Kardas et al., 2022) and engaging in repeated helping and prosocial behavior (e.g., O'Brien & Kassirer, 2019).

3.2 Other key questions and predictions

3.2.1 Factors that moderate people's initial need to respond

One additional question pertains to research on the factors that moderate people's initial perceptions that there is a need to respond to begin with ("Need to respond?" box in Fig. 3). As proposed there, the prediction is that the rest of the process is triggered by "Yes"; an answer of "No" should instead lead people to rely on salience and quality alone. Also as noted earlier, there is good psychological reason to predict that "Yes" responses are generally more common than "No" responses.

The model proposes that certain kinds of factors should moderate people's answers, a list that includes (but is not limited to) people's personal involvement with the potential change (with the prediction that a higher personal involvement should pull people toward "Yes" rather than "No"); people's adherence to broader norms or expectations about whether they should respond (with the prediction that a higher adherence should pull people toward "Yes" rather than "No"); and people's perceptions of the stakes or urgency of the need to respond (with the prediction that higher perceived stakes or urgency should pull people toward "Yes" rather than "No"). Some of the research I reviewed in Section 3.1 supports some of these predictions, such as the research on self-other asymmetries (with people treating themselves differently than how they treat others—which presumably should also feed into people's initial decisions about the need to respond to begin with, in corresponding ways). More research should test each of these factors and directly manipulate them as initial inputs into triggering the rest of the process.

3.2.2 Low abilities/capacities to respond as an input that moderates perceived disruption costs

Another question pertains to additional research on the factors that moderate the exacerbation vs. alleviation of perceived disruption costs (upward

arrow and downward arrow, respectively, in Fig. 3), as these paths predict different outcomes for crossing change thresholds. The model proposes that certain kinds of factors should moderate which of these paths people take, a list that includes (but is not limited to) people's abilities or capacities to respond to the potential change (with the prediction that lower vs. higher abilities/capacities should exacerbate vs. alleviate perceived disruption costs); people's willingness to respond (with the prediction that lower vs. higher willingness should exacerbate vs. alleviate perceived disruption costs); and people's perceived value in responding (with the prediction that lower vs. higher perceived value should exacerbate vs. alleviate perceived disruption costs).

Much of the research that has already been reviewed (the aforementioned "Predictions and Evidence" section) covers and supports the role of factors like willingness and value. However, more research should directly test the role of perceived abilities and capacities. For example, the model would predict that contexts in which people feel highly skilled to manage change, and/or people possess ample time and energy to manage change, should alleviate perceived disruption costs and thus lead people to become more open to judging that change has occurred; contexts in which people feel unskilled or to possess little time and energy should exacerbate perceived disruption costs and thus lead people to become less open to judging that has occurred.

3.2.3 The intersection of inputs

Which of the above inputs into people's initial need to respond—personal involvement vs. norms/expectations vs. stakes/urgency vs. something else—matter "most" in influencing judgment at this initial stage? Likewise, which of the above inputs into people's perceived disruption costs—ability/capacity vs. willingness vs. value vs. something else—matter "most" in influencing judgment at this subsequent stage?

Such factors are free to co-occur and potentially interact beyond the laboratory. For example, when people encounter signs of decline, the valence-asymmetry reviewed earlier suggests that people's willingness to respond and their perceived value in responding should be high, thus alleviating disruption costs and prompting them to be quick to conclude that decline is occurring (all relative to their responses to equivalent improvement). However, this assumes similarly high levels of people's ability and capacities to respond—which is not always the case in less controlled contexts. When people's willingness and value are high, but

their perceived abilities/capacities are low, I predict the latter "wins out" in judgment given the primacy of perceived competence in people's self-assessments (as compared to, e.g., the relative inferiority of perceptions of other traits, like one's own warmth, in self-assessments: Abele & Wojciszke, 2014; see also Abele, Ellemers, Fiske, Koch, & Yzerbyt, 2021; Koch, Yzerbyt, Abele, Ellemers, & Fiske, 2021); here people may conclude that perceived disruption costs are too high to intervene and therefore contract their change thresholds. As such, the dimension of ability/capacity should interact with the valence asymmetry reported earlier.

3.2.4 Unpacking the "3-way interaction" between attention (salience), evaluation (quality), and behavioral monitoring (disruption costs)

Likewise, a similar point is to be made for the model's broader variables in Fig. 2: How might attention (salience), evaluation (quality), and behavioral monitoring (disruption costs) more precisely co-occur and potentially interact with each other? The model does not specify exact weights for each component; this means, for example, that exceptionally high salience or quality might dilute the influence of disruption costs and thus make the proposed process in Fig. 3 less likely to be recruited or relied upon to begin with. Likewise, note that the monitoring process can also feed back into attention and evaluation.

Across these combinations, however, the model predicts that disruption costs should generally take precedent, all else equal. This proposition is grounded in the fact that thinking is for doing (Fiske & Taylor, 1991; James, 1890). It follows that people should tend to give the most judgment weight to the variable in the model that bears most directly on their action and action decisions (i.e., to perceived disruption costs). Indeed, from this perspective, note that these variables might sometimes even reflect distinct aspects of change perception, which need not interact: people's sensitivity in discriminating between existing vs. non-existing change (as influenced by salience and quality), and people's drawing of change thresholds (as influenced by disruption costs).

One can model change perception in this way as it follows from SDT (see Wixted, 2020), crossing the question of whether there is actual change (*yes* vs. *no*) with the question of whether people think there is change (*yes* vs. *no*). Fig. 8 shows the four resulting outcomes. According to this SDT-based framework, people's discrimination sensitivity bears on the first question (is there actual change?). Discrimination sensitivity is high when people can correctly distinguish between cases involving actual change and

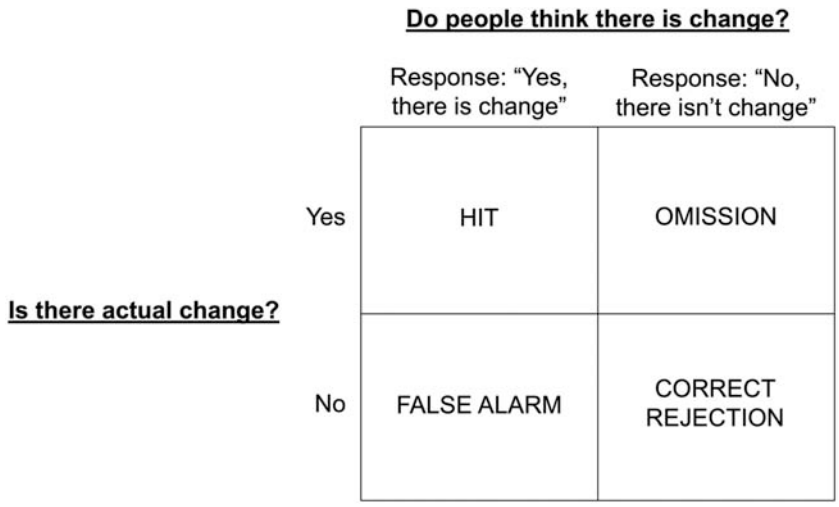

Fig. 8 A model of change perception as it follows from signal detection Theory, crossing the question of whether there is actual change (*yes* vs. *no*) with the question of whether people think there is change (*yes* vs. *no*). The figure shows the four resulting outcomes.

no actual change, yielding a high rate of hits and a high rate of correct rejections. People's threshold judgments bear on the second question (do people think there is change?). When people expand their thresholds (i.e., when people are especially likely to think *yes, there is change*), they therefore might have a high rate of hits but also a high rate of false alarms. When people contract their thresholds (i.e., when people are especially unlikely to think *yes, there is change*), they therefore might have a high rate of correct rejections but also a high rate of omissions. This STD logic highlights how discrimination sensitivity and threshold can operate independently, in that either one can vary independent of the other. This logic supports my conceptual argument here that salience and quality might influence people's discrimination sensitivity (but not necessarily influence people's threshold for responding *yes, there is change*), whereas disruption costs might influence people's threshold for responding *yes, there is change* (but not necessarily influence people's discrimination sensitivity).

3.2.5 Are flexible thresholds adaptive or maladaptive? The roles of accuracy and time horizon in the model

A final additional question pertains to whether people's tendency to be flexible in their judgments of change thresholds—such that people deny

change under high disruption costs but accept change under low disruption costs, given all else equal in information salience and information quality—is adaptive vs. maladaptive.

One relevant factor here is to compare people's judgments of change to an available objective or externally-supported benchmark for change. In many contexts, accuracy (vs. inaccuracy) is presumably a reasonable guide for assessing the adaptive (vs. maladaptive) nature of these judgments, assuming that people's goal is to be accurate (or at least assuming that being accurate serves people well). For example, if people's goal is to accurately judge the rate at which their health is truly declining, but they dismiss the possibility of decline under high perceived disruption costs, this tendency would presumably count as maladaptive. In this case, flexible thresholds interfere with one's goal.

A broader (and I suspect more consequential) factor entails people's time horizon. From the perspective of short time horizons—meaning that people do not particularly need to account for the connection between their present outcomes and their future outcomes, and can essentially treat their current judgment as a one-shot judgment—being flexible in one's threshold judgments may be reasonably adaptive. In effect, people would essentially be acting as Bayesians-in-isolation ("When the facts change, I change my mind"). If a person lacks the resources to handle a change at the current moment, for example, it "makes sense" from this one-shot perspective to punt on registering and responding to that change. In contrast, from the perspective of long time horizons—meaning that people indeed need to account for the connection between their present outcomes and their future outcomes, and essentially need to treat their current judgment as one part of an ongoing multi-shot judgment—being flexible in one's threshold judgments instead likely errs toward being maladaptive. The implications here for self-oriented outcomes is clear: The goal to make it through day-by-day comes at the cost of making it through and achieving longer-term goals. There are also implications for other-oriented outcomes, given that people may violate their social judgment thresholds at the whims of the moment at the cost of maintaining a recurring and longer-term relationship. Group coordination breaks down if every individual responds to their own immediate needs only. Klein and O'Brien's (2023) Experiments 6a–6b directly documented such tensions: Actors who formed judgments based on flexible thresholds over time were judged by observers as hypocritical and as less trusting and reliable.

3.3 Contributions and applications of flexible threshold theory

Change judgment as a topic of psychological inquiry has traditionally been led by cognitive psychologists studying basic processes of attention and memory or sensation and perception (e.g., entailing experiments designed to track participants' abilities to notice changes within a repeated pattern of simple images or sounds; for one review of research from such an approach, see Rensink, 2002). This focus has provided very useful insights into these basic processes (some of which have informed my own theorizing here; see Section 2) but at the same time may have neglected the richer dynamics that are involved in how people judge the presence or absence of changes in themselves, in others, and out in the world more broadly.

For example, and most relevant to the current chapter, the role of perceived disruption costs and how they might influence people to "move the goalposts" might not be fully captured or even activated by these basic cognitive paradigms (although perhaps they interestingly might; e.g., high perceived disruption costs could amplify the "invisible gorilla" effect in change blindness studies: Chabris & Simons, 2010)—yet, as I have proposed throughout, this dimension might prove to be critical in how people navigate richer self and social change. By historically situating the study of change judgment in terms of purely cognitive variables, the field to date might downplay processes like motivated reasoning (Kruglanski, Jasko, & Friston, 2020; Kunda, 1990) and motivated perception (Cole & Balcetis, 2021) that better capture how people actually navigate change in themselves and others out in everyday life. To echo earlier terminology, the traditional study of change judgment seems to paint people as forming *discrimination* judgments alone ("Is something different now than it was before?"), but such judgments and their impact on behavior cannot be fully understood without accounting for people's *threshold* judgments in tandem ("Is this difference meaningful? Do I have to respond?")—which I argue go beyond purely cognitive considerations, especially in how people judge richer self and social change (see Fig. 8).

Indeed, the model presented here can uniquely predict and explain why people sometimes deny change in the face of highly salient and high-quality signals, and likewise why people sometimes believe that change has indeed occurred in the face of lowly salient and low-quality signals. Given that people's crossing of change thresholds (or their failure to cross change thresholds) bears on their decisions to officially act and intervene in

response—or instead to officially to give up, having hit the perceived point of no return—modeling these dynamics not only helps fill theoretical gaps (e.g., by bridging the traditional basic-cognitive paradigms with richer social paradigms; by understanding change perception not just as a function of discrimination judgments but also as a function of threshold judgments), but it also speaks directly to understanding and reinterpreting many real-world issues in a novel light.

Table 2 provides an overview of some key domains and questions of interest, each of which are reviewed below. A number of these ideas are already tested and/or discussed in the earlier-reviewed research from my own laboratory (see Section 3). Thus, to supplement and expand that earlier review, below I will highlight related research and evidence from elsewhere across the field.

3.3.1 Flexible thresholds in health and happiness

It is critical for people to accurately detect diagnostic changes to their physical and mental health as it naturally fluctuates over time. Numerous health-related improvements and declines are represented by objective thresholds for diagnostic change (e.g., the presence or absence of particular biomarkers), leading many medical scholars to advocate for early detection screenings (for reviews, see Berry et al., 2005; Etzioni et al., 2008). For example, the mortality rate of prostate cancer in the United States decreased by about a third during the 1990s, which is thought to be explained by coinciding widespread increases during that time in the implementation in the use of early detection screenings; up to 70% of the decrease can be plausibly explained by such screenings (Etzioni et al., 2008).

Unfortunately, people sometimes choose to avoid learning such information. Prior research has revealed a general resistance among people to learning health-related feedback in the first place, especially when they worry that it might be negative (e.g., Howell & Shepperd, 2012; see also Golman, Hagmann, & Loewenstein, 2017). A similar idea is found in research on denial and addiction recovery whereby people selectively choose to ignore and dismiss information that would indicate problem behavior (e.g., Ward & Rothaus, 1991).

According to the current model, however, this issue will not be resolved by informational learning alone. Even when full information is saliently brought to people's attention, and even when people believe that information, there may still be the psychological challenge of people shifting their thresholds for the amount or kind information that really

Table 2 Some applications of flexible threshold theory.

Flexible thresholds in judgments of…	Research question (example)	Hypothesis (example)	Supporting evidence (example)	Further support (examples)
Health	Do people accurately detect changes in their and others' health?	When perceived disruption costs are high (vs. low), people are less (vs. more) accurate at detecting changes in health—holding constant attention to and salience of health information.	O'Brien and Klein (2017)	Howell and Shepperd (2012), Golman et al. (2017), Ward and Rothaus (1991)
Happiness	Do people accurately detect changes in their and others' happiness?	When perceived disruption costs are high (vs. low), people are less (vs. more) accurate at detecting changes in happiness—holding constant attention to and salience of happiness information.	O'Brien and Klein (2017)	Mitchell et al. (1997), Wirtz et al. (2003), Ross (1989), Wilson et al. (2003)
Close relationships	Do people accurately detect changes in their and others' relationships?	When perceived disruption costs are high (vs. low), people are less (vs. more) accurate at detecting changes in relationships—holding constant attention to and salience of relationship information.	O'Brien and Kardas (2016)	Kammrath and Peetz (2012), Rusbult and Martz (1995)

Group dynamics	Do people accurately detect changes in their social standings?	When perceived disruption costs are high (vs. low), people are less (vs. more) accurate at detecting changes in their social standings—holding constant attention to and salience of group information.	O'Brien and Kardas (2016)	Leary and Baumeister (2000)
Social judgment	Do people judge changes in others as others judge themselves?	When perceived disruption costs are high (vs. low), people are less (vs. more) calibrated in their social judgments—holding constant attention to and salience of other-oriented information.	Klein and O'Brien (2023)	Abele and Wojciszke (2014), Koch et al. (2021)

(*continued*)

Table 2 Some applications of flexible threshold theory. (*cont'd*)

Flexible thresholds in judgments of…	Research question (example)	Hypothesis (example)	Supporting evidence (example)	Further support (examples)
Reform/corruption	Do people fairly judge reformed others as reformed and corrupted others as corrupted?	When perceived disruption costs are high (vs. low), people are less (vs. more) calibrated in their reform/corruption judgments—holding constant attention to and salience of other-oriented information.	Klein and O'Brien (2017)	Brown (2003), McAdams and Bowman (2001)
Reward/punishment	Do people reward and punish others at the points they intend to?	When perceived disruption costs are high (vs. low), people are less (vs. more) calibrated in their matching of intended vs. actual action—holding constant attention to and salience of other-oriented information.	Klein and O'Brien (2023)	Lacey and Pickard (2015)

Climate change	Do people accurately recognize climate change?	When perceived disruption costs are high (vs. low), people are less (vs. more) calibrated in recognizing climate change—holding constant attention to and salience of climate-change information.	O'Brien (2022b)	Campbell and Kay (2014), Feinberg and Willer (2011), Kahan et al. (2012)
Business	Do people accept and adopt changes to business plans?	When perceived disruption costs are high (vs. low), people are less (vs. more) open to business change—holding constant attention to and salience of business-change information.	O'Brien (2022b)	Kotter (1996)
Economics	Do people accurately recognize changes in economic cycles?	When perceived disruption costs are high (vs. low), people are less (vs. more) calibrated in recognizing economic cycles—holding constant attention to and salience of economic-cycle information.	O'Brien and Klein (2017)	Leiser and Krill (2017)

(*continued*)

Table 2 Some applications of flexible threshold theory. (*cont'd*)

Flexible thresholds in judgments of…	Research question (example)	Hypothesis (example)	Supporting evidence (example)	Further support (examples)
Social issues	Do people recognize others' identity change?	When perceived disruption costs are high (vs. low), people are less (vs. more) open in recognizing others' identity change—holding constant attention to and salience of identity information.	O'Brien (2022b)	Broockman and Kalla (2016)
Societal progress	Do people accurately recognize societal change over time?	When perceived disruption costs are high (vs. low), people are less (vs. more) open in recognizing societal change—holding constant attention to and salience of societal information.	O'Brien (2022b)	Hur and Ruttan (2023), Mastroianni and Dana (2022), Onyeador et al. (2021)

Technology	Do people resist technological advances over time?	When perceived disruption costs are high (vs. low), people are more (vs. less) resistant to technological advances—holding constant attention to and salience of technological information.	O'Brien (2022a)	Kipnis (1991)
Motivation	Do people change their goal thresholds during goal pursuit?	When perceived disruption costs are high (vs. low), people are more (vs. less) likely to change their goal thresholds—holding constant attention to and salience of goal information.	Wald and O'Brien (2022)	Harken et al. (2016), Soman and Cheema (2004)
Persuasion	Do people resist effective persuasive appeals?	When perceived disruption costs are high (vs. low), people are more (vs. less) resistant to effective persuasive appeals—holding constant attention to and salience of appeal information.	Klein and O'Brien (2017)	Cialdini (2021)

counts as official health-related change. For example, when people are under low resources or currently feel unable to effectively address a change in health, the model suggests that perceived disruption costs will be exacerbated—and thus presenting them with otherwise identical information about health-change will be ineffective (as they may simply contract their threshold for diagnosing it as such).

One can extend this logic to well-being writ large beyond strict health outcomes, such as to understanding people's broader judgments of changes in their happiness, enjoyment, meaning in life, life satisfaction, and so forth. For example, people commonly keep tabs on how their life satisfaction has changed and is changing over time, which in turn can influence their judgments of life satisfaction in the present (e.g., Busseri, Choma, & Sadava, 2009; Higgins, Tykocinski, & Vookles, 1990; Pavot, Diener, & Suh, 1998). It matters to know whether people believe that their life satisfaction (and so on) has been heading in the right vs. wrong direction because such judgments impact what they do next: In principle, accurately recognizing declines in such measures over time should prompt people to take appropriate reparative action just as accurately recognizing improvements in such measures over time should prompt people to take appropriate time to celebrate the achievement (e.g., Mitchell, Thompson, Peterson, & Cronk, 1997; Ross, 1989; Wilson, Meyers, & Gilbert, 2003; Wirtz, Kruger, Scollon, & Diener, 2003). The current model, however, suggests perceived disruption costs interfere with accurate recognition in both cases.

3.3.2 Flexible thresholds in close relationships and group dynamics

Flexible thresholds can also shine light on the development, maintenance, and progression of close relationships, the successful management of which is critical for people's intrapersonal and interpersonal functioning (Bowlby, 1969). Popular models of relationship conflict, for example, highlight factors like partners' attention to each other's flaws (e.g., Murray, Holmes, & Griffin, 1996) and partners' reciprocal lies and betrayals (e.g., Finkel, Rusbult, Kumashiro, & Hannon, 2002; Kammrath & Peetz, 2012) in explaining when and why successful relationships break down. The model presented in the current chapter can situate such answers under a broader conceptual umbrella: judgments of diagnostic change made between partners. How partners make sense of change in themselves and each other should represent a critical juncture for determining, for example, when the spark has officially been ignited or has officially gone out—and therefore

change their behavior accordingly (i.e., with partners either further pursuing or finally exiting the relationship). To the extent that perceived disruption costs play a role in such judgments, then partners are at risk of both "acting too soon" in that they quickly conclude that the spark has been ignited (in contexts of low perceived disruption costs) as well as "acting too late" in that they slowly conclude that the spark has gone out (in contexts of high perceived disruption costs). Further complicating matters are cases in which partners perceive differential disruption costs from each other. One reason, for example, why people sometimes stay in abusive relationships may be due to exacerbated disruption costs at the time of imagining official relationship decline and thus leaving it. This may help at least partly explain people's nonvoluntary dependence in abusive romantic relationships (Rusbult & Martz, 1995).

This logic should also extend to other kinds of group dynamics, both small and large. For example, one could fruitfully integrate the notion of disruption costs in change perception into Leary and Baumeister's (2000) sociometer theory, which states that people's self-esteem is primarily driven by their ongoing beliefs about the extent to which they are relationally valued and socially accepted. Critical junctures should occur at change thresholds, such that people not only monitor for fluctuations in these other-oriented states but especially monitor for when those fluctuations represent meaningful shifts. Contexts of high disruption costs should lead people to overlook self-declines and self-improvements as construed in the eyes of their social networks.

3.3.3 Flexible thresholds in social judgment and reward/punishment

On the flip side of the above dynamics, another important domain where flexible thresholds should apply entails how people themselves judge and treat others. For example, the current model suggests that perceived disruption costs will interfere with people's judgments of positively-regarded targets who have "fallen from grace" and negatively-regarded targets who have worked to reform. Indeed, people care about character change in others, as evidenced across both popular culture (e.g., the folktale of villain-turned-hero that can be found in many entertainment media: Poore, 2017) and across the psychological literature (e.g., in research on the primacy of warmth and other such traits [vs. competence] in judging others: Abele & Wojciszke, 2014; see also Abele et al., 2021; Koch et al., 2021; in research on redemption narratives: McAdams & Bowman, 2001). Such judgments of character change are especially consequential, for example, in legal

contexts and their notion of proportionality—with people issuing rewards and remunerations to those they deem as having reformed and paid their debts, and punishments and penalties to those they deem as having officially crossed the line (Lacey & Pickard, 2015).

The current model suggests that perceived disruption costs will interfere with such judgments, with people (for example) unfairly hesitating to grant others' reform in contexts of high disruption costs or being overly eager to grant others' reform in contexts of low disruption costs, holding all else equal in the evidence for change. This may explain why some people are slower vs. quicker to forgive others for past wrongdoings. For example, research on individual differences in forgiveness tendencies finds that individuals who tend to withhold (vs. grant) forgiveness are those who score higher in self-reported depressive symptoms at the time of judgment (Brown, 2003)—which is consistent with the notion that such individuals should perceive exacerbated disruption costs for registering change in others at the time of judgment.

3.3.4 Flexible thresholds in world events

One can also fruitfully apply the current model to understanding and reinterpreting how people think about change (or fail to think about change) more broadly out in the world (e.g., climate change; trends in business and economics; social and societal progress). Indeed, to take just one timely example, consider the idea of people coming around to believing in a "new normal" state-of-things after a sudden shock—such as in how people came to terms with everyday life after the emergence of the COVID-19 pandemic (Berwick, 2020). In some sense, the very notion of the "new normal" is a flexible threshold—with people perhaps punting on acknowledging diagnostic decline by reframing it.

Or, for instance, take the polarization of beliefs among the general public about the existence and the extent of climate change. Popular theories for why some people deny climate change despite scientific consensus otherwise propose ideas that conceptually resemble my traditional model of change thresholds as shown back in Fig. 1—that is, ideas involving the roles of informational salience and informational quality. For example, it has been proposed that some people perhaps do not have access to the scientific facts, or do not sufficiently understand them—and if they did, the presumption here is that they would update their beliefs about change accordingly (Sunstein, 2007; Weber & Stern, 2011). The current model offers a different answer: In contexts of high perceived disruption costs, people are prone to

contracting their thresholds for diagnosing change and thus will become more likely to deny the problem (e.g., in this case, the problem of climate change). This prediction is consistent with the finding that people who feel an identity-threat from climate change (e.g., people who dislike the proposed solutions based on in-group norms or ideological grounds) are more likely to deny its existence than people who do not feel such an identity-threat (e.g., Campbell & Kay, 2014; Feinberg & Willer, 2011; Kahan et al., 2012). Indeed, note that this latter finding represents one specific example that fits into the broader umbrella of the current framework; the notion of identity-threat serves as one of many possible inputs into perceived disruption costs (which I argue is the broader psychology at play).

The same logic should extend to understanding how people think about other broader changes in the world, such as in people's (differential) reactions to booms and busts in economic cycles (e.g., Leiser & Krill, 2017) and in people's (differential) reactions to changing business trends. Contexts of high perceived disruption costs will interfere with people's accurate detection of improvements and declines. Behavioral responses in such domains are often time-sensitive, with any needless delay to action risking tangible costs to profit and production. Employees' first reactions to change initiatives is often to oppose them, leading scholars of change management to advocate targeting employees' beliefs that change is indeed urgently needed in the first place (Kotter, 1996)—another example of essentially trying to reduce perceived disruption costs.

Other such applications can be found in debates about societal and generational progress, across many consequential issues. The extent to which people do vs. do not invest in addressing current social problems depends on their perceptions of past progress made toward solving those problems (e.g., Hur & Ruttan, 2023; Mastroianni & Dana, 2022; Onyeador et al., 2021). To this end, the current model suggests that contexts of higher vs. lower perceived disruption costs may artificially slow vs. accelerate attitude change on social issues, may artificially build vs. hinder support for making technological and scientific advances, and so forth. One reason why someone might maintain an outdated prejudice of theirs despite evolving social standards that go against this prejudice (e.g., perhaps the person chooses to keep transphobic beliefs) may be because they perceive high disruption costs to their lives for having to change their mind. Timeless complaints from older generations about younger reflects may reflect similar perceived concerns. Luddism (Kipnis, 1991) might simply be a proxy for people who perceive high disruption costs to change.

Again, across these examples, the unique perspective put forth by the current model is one that holds constant informational salience and informational quality. This is in contrast to existing models that highlight salience and quality alone. Take, for instance, the question of whether people are willing to change an outdated prejudice. Broockman and Kalla (2016) tested an exposure hypothesis whereby briefly chatting with a transgender canvasser was found to decrease transphobic beliefs. The presumption here is that information changes people's minds. My model suggests that information alone is not enough; one needs to also account for people feeling equipped to change their minds. My prediction is that effects like Broockman and Kalla's (2016) exposure effect should be even stronger when information is delivered to the target within contexts that simultaneously alleviate the target's perceived disruption costs upon receiving it.

Or, to take a different example, consider the fact that humanity has experienced large gains in various facets of quality of life over historic time (e.g., rising life expectancy, waning world warfare: Pinker, 2018). However, people do not always recognize these positive changes (what Pinker, 2018 calls "progressophobia"). Why? An intuitive answer is that people are simply unaware of these facts, and so delivering them should calibrate people's beliefs. Another answer, derived from my model, is that delivering the facts will not help among people who are in contexts of high perceived disruption costs (e.g., perhaps they are concerned that recognizing progress would force a disruption to their current goals). They could see and believe the facts, but adjust their threshold for what is still needed to really count as progress in the first place.

These kinds of social, cultural, and political examples also invite new insights into other relevant individual differences, such as between conservatives vs. liberals. A defining ideological difference between these groups is that conservatives tend to be less comfortable with change as compared to liberals (e.g., conservatives vs. liberals tend to be less open to new experiences and more tied to the status quo: Jost, Glaser, Kruglanski, & Sulloway, 2003), and scholars have argued that this difference is at least partly explained by more general deficiencies in information processing (e.g., arguing that conservatives vs. liberals have lower cognitive complexity and aptitude: Baron & Jost, 2019). The current model offers a different answer: differences in perceived disruption costs to change (beyond people's understanding of the information per se). As put in current terms, conservatives may tend to perceive relatively high disruption costs to change (e.g., as suggested by the finding that they feel more

threatened by social change: Rasmussen et al., 2022) and thereby contract their change thresholds whereas liberals may tend to perceive relatively low disruption costs to change and thereby expand their change thresholds. As such, the current model makes a unique prediction for further understanding these groups and related ones: Upon being presented with otherwise identical evidence for potential change, liberals are at risk of over-reaction (jumping to see change where none exists) while conservatives are at risk of under-reaction (missing change that indeed is occurring)—both stemming from a shared underlying psychological mechanism.

3.3.5 Flexible thresholds in other matters of motivation and persuasion

Finally, the current model also bears on other important contexts related to matters of motivation and persuasion. First, in terms of motivation, there has been ample research on the topic of goal monitoring and the effects of tracking goal progress on goal achievement. One consistent finding is that people tend to perceive goal progress in proportional rather than absolute terms; as a result, the relatively closer that people feel toward their goal threshold, the more motivated they tend to be to make it to that mark (e.g., Carver & Scheier, 1990; Harken et al., 2016; Hull, 1932). From this perspective, researchers have been keen to identify manipulations that might shrink people's felt distance toward their goal threshold and thus increase their achievement motivation (e.g., "My goal was to lose 5 pounds, and I've lost 3 so far"—how to get people to feel like "3" is very close to "5"?). From the perspective of the current model, however, such manipulations may overlook another possibility that likely occurs often in everyday life: People changing their goal threshold altogether. Differences in perceived disruption costs could explain when goal-setters disengage from a goal altogether (e.g., "My goal was to lose 5 pounds, and I've lost 3 so far"—"I give up") vs. when otherwise identical goal-setters instead flexibly adjust the threshold (e.g., "My goal was to lose 5 pounds, and I've lost 3 so far"—"But, actually, 3 is perfect"), all else equal. Put another way, differences in perceived disruption costs could explain when an "all-or-nothing goal" (Soman & Cheema, 2004) transforms into a "something-is-enough" goal, which the typical past study designs in this literature may not have fully captured.

Here, too, one could fruitfully re-examine change-relevant individual differences through the lens of the current model. One prominent

individual difference in research on motivation is Dweck and colleagues' notion of mindset differences (for a review, see Dweck, 2006), such that some people tend to hold an incremental or growth mindset (meaning they believe in change—e.g., that they can improve their intelligence) whereas others tend to an entity or fixed mindset (meaning they do not believe in change—e.g., that their intelligence is what it is). Why do people vary in these mindsets? Dweck's answer is development: Different kinds of reinforcement lead people to learn different beliefs about their abilities (e.g., praising a child's outcomes can foster a fixed mindset whereas praising a child's effort can foster a growth mindset: Mueller & Dweck, 1998). Again, the current model offers a different answer: differences in perceived disruption costs to change (beyond some stable trait or the person's history of reinforcement per se). As put in current terms, fixed-mindset people may tend to perceive relatively high disruption costs to change and thereby contract their change thresholds whereas growth-mindset people may tend to perceive relatively low disruption costs to change and thereby expand their change thresholds. As such, the current model uniquely predicts that influencing perceived disruption costs should influence anyone's mindset, in either direction: Alleviating disruption costs should elicit growth-mindset thinking while exacerbating disruption costs should elicit fixed-mindset thinking.

Second, in terms of persuasion, a well-established psychological principle is that, although having good arguments and good rhetoric may be necessary for persuading others to come around to one's views, such information is insufficient on its own. Effective persuaders must also account for the social contexts in which that information is delivered to and interpreted by those others (Cialdini, 2021); the *when* also matters, in addition to the *what*. The current model adds to this idea by highlighting the need to account for others' perceived disruption costs in response to one's persuasive appeal. For example, when others happen to be very busy in their lives at the moment and thus find themselves in a context of high perceived disruption costs of acknowledging new change, they may be less receptive to one's persuasive appeal regarding some important decline in the world, and conclude that such data does not really meet the critical mark—holding constant their attention to and evaluation of that appeal otherwise. Persuaders may waste their strongest argument by sharing it with others in contexts of high disruption costs.

One can also consider the converse problem following from this same rationale: People might jump to be persuaded by poor persuasive evidence

of change simply when they happen to be in contexts of low perceived disruption costs (e.g., perhaps they have ample time or other resources at their disposal and so "go looking" for the existence of declines or improvements).

3.4 Research agenda for flexible threshold theory

3.4.1 Further tests of model predictions

Future research can and should fruitfully continue to test the numerous predictions that follow from the model, including and also beyond the predictions that are proposed here (see Section 3.2). To echo an earlier point, for example, future research could more precisely map out the weightings of attention, evaluation, and behavioral monitoring (and their interactions) throughout the time course of the judgment process. Consistent with the model, one should expect that an extreme salience of extremely high-quality signals of change might lead people to be less reliant on perceived disruption costs, just as a lack of salience and quality might lead people to be especially reliant on perceived disruption costs—here leading people to conclude that change has occurred in cases when it has not (thus promoting suboptimal resource allocation). This idea also highlights that different measurements of change might matter beyond the contexts that have been tested thus far (e.g., O'Brien & Klein, 2017; see Table 1) if they evoke different levels of salience and/or convey different quality (e.g., judging change as it unfolds via a growing frequency of small compounding events vs. as it unfolds via one or two major shocks).

Another fruitful avenue for research is to further test accuracy by assessing contexts that entail objective or externally-supported change thresholds, thus allowing one to test the extent to which people's subjective judgments stray from these objective marks, with the theory predicting that this should be a function of people's perceived disruption costs. Less straying should occur when people take change thresholds as an obvious given (e.g., presumably, few people think that today has turned into tomorrow at some time other than 12:00 AM), and more straying should occur when people view change thresholds as more discretionary or arbitrarily set—which I suspect is very common, even for seemingly objective marks. For example, popular financial press often sets a threshold for identifying bull (vs. bear) markets at the point when the stock market index rises (vs. falls) by more than 20% over a two-month period (Pagan & Sossounov, 2003); climate science has set a threshold for the "point of no return" of climate change at the point when Earth's average temperature

crosses 1.5 °C above preindustrial levels (Aengenheyster, Feng, van der Ploeg, & Dijkstra, 2018); medical science has set a threshold for when a healthy person officially becomes a feverish person at the point when their internal body temperature crosses 100.4 °F (Garner, Jarvis, Emori, Horan, & Hughes, 1988); and so forth. The unique prediction here is that low perceived disruption costs lead people to judge the crossing of these thresholds too soon whereas high perceived disruption costs lead people to judge the crossing of these thresholds too late.

A related question on this front is: Are people *aware* that they "move the goalposts"?—that they flexibly adjust their thresholds based on how they think change from the past bears on their present? This question is important because one might expect that high awareness would impel people to simply be accurate rather than stray when they really want to get it right. People may have some awareness—the model can accommodate automatic or deliberate judgments alike, or a mix of both—but a long history of psychological research highlights that people are often (at least partially) blind to their underlying judgment processes, and perhaps especially so to processes such as rationalization (Kunda, 1990; Nisbett & Wilson, 1977; Wilson, 2004).

3.4.2 Using the model as a broader explanatory framework

Future research can and should also continue to use the model a broader explanatory framework, which might serve to further integrate diverse findings around a study of change judgment beyond purely cognitive variables. Numerous findings from elsewhere have already been reviewed that might be fruitfully re-explained and re-understood through the lens of the current model of change thresholds and disruption costs, ranging from findings in research on interpersonal dynamics (e.g., using perceived disruption costs to explain people's nonvoluntary dependence in close relationships: Rusbult & Martz, 1995) to findings in research on individual differences (e.g., using perceived disruption costs to explain the correlation between forgiveness tendencies and depressive symptoms: Brown, 2003; to explain liberal-conservative differences: Jost et al., 2003; to explain mindset differences: Dweck, 2006) to findings in research on goal progress and motivated reasoning (e.g., using perceived disruption costs to explain why identity-threat promotes solution aversion: Campbell & Kay, 2014), and beyond. The diversity of self-change and social-change applications beyond purely cognitive variables (see Table 2) further highlights the model's potential usefulness as a broader conceptual umbrella, and more research

can and should test people's process of judging change across these applied domains and others.

Throughout, future research could also continue to expand the notion of change thresholds and perceived disruption costs to understanding additional kinds of both person-based and situation-based inputs (e.g., personality and cultural differences in what people construe as evidence for change to begin with). The broader connecting thread here is that people flexibly adjust their judgments of how things have or have not changed for reasons that go beyond the evidence for change per se. As reviewed, this connecting thread can serve to help re-explain and resolve conundrums in the literature and in everyday behavior (e.g., why people might sometimes hit a pre-set improvement goal yet not be happy about it, or fall short of one but indeed be happy about it; why people might sometimes fail to recognize obvious decline or improvement, or believe that such change has indeed occurred when in fact it has not).

3.4.3 Using the model as an intervention tool for behavioral science

Finally, the model presents an exciting opportunity to design behavioral interventions to help people more effectively respond to meaningful declines and improvements that occur in themselves and others and also more generally out in the world. To achieve this goal, one could borrow the notion of "wise" interventions in psychology, which are those that are designed to target people's underlying thought processes that might contribute to, for example, broader social problems (Walton, 2014). The current model theorizes that a particular kind of thought process indeed ought to be targeted: One must take into account people's judgments of change thresholds (i.e., their recognition that such change is indeed occurring or not occurring in the first place)—as uniquely targeted around influencing people's perceptions of disruption costs to change.

For example, consider the case of a person who fails to recognize their declining health and thus fails to take necessary remedial action. How and where can behavioral science intervene to help? Going beyond pure information-based strategies, such as trying to convince the person of the seriousness of the problem (e.g., Feinberg & Willer, 2011) or of the attractiveness of the solution (e.g., Campbell & Kay, 2014), the current model advises a disruption-based strategy: The person should be more likely to recognize their declining health (and thus be more likely to do something about it) when they feel well-equipped to handle the change in the first place. The wisdom is to intervene on the person's perceived disruption costs and try

to alleviate them (e.g., by giving them ample time or other tools to reduce their response effort), before anything else. The unique prediction here is that people should be more open to detecting problems if they first think they can solve them.

4. Conclusion

Understanding when and why people cross change thresholds—that is, when and why people conclude from evidence of possible change that things are changing in a meaningful and lasting way—represents a critical juncture for understanding people's response behavior. The first step to fixing decline or celebrating improvement is recognizing things have changed. This chapter proposed a flexible threshold theory for modeling a fuller psychology underlying this process, for both declines and improvements alike. According to the theory, change perception entails more than simply discriminating differences; it also entails people's evaluations and beliefs about recognizing those differences. Put more specifically, people's judgments of change depend not only on the salience and quality of the evidence but also on people's beliefs about the extent to which acknowledging change would disrupt their immediate situation, and people typically prefer to avoid disruption. In turn, and as reviewed throughout the chapter, variables that exacerbate perceived disruption costs lead people to contract their change thresholds whereas variables that alleviate perceived disruption costs lead people to expand their change thresholds, holding constant the salience and quality of the evidence for change itself. People are slower vs. quicker to recognize and act on change from the past depending on how doing so would affect their presents, with higher perceived disruption costs slowing change judgment and lower perceived disruption costs hastening change judgment.

Put simply: It is not so much that "acknowledging the problem is the first step to its solution" (Dewey, 1910) as it is that "acknowledging the solution is the first step to seeing the problem in the first place." People flexibly adjust their thresholds for judging change from the past based on how they think it will affect their presents. Although this flexibility might be relatively adaptive at short time horizons, it likely is more maladaptive at long time horizons.

The idea that change thresholds underlie people's perceptions and responses to change—and that people's crossing or not crossing of these

thresholds depends on factors beyond the evidence per se (i.e., on perceived disruption costs)—significantly advances psychological research on change perception. Traditionally the territory of basic cognitive psychology, there is now diverse and growing evidence for the role of change perception in rich and critical domains of self and social judgment that highlights the need for further research on this front beyond purely cognitive variables. That things change is a fact of life, but people's acknowledgment of this fact may prove just as central for understanding how people live.

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