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For better or for worse? Investigating the meaning of change

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By

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Abstract

For most, change makes a regular appearance in everyday life and has the capacity to usher in excitement, growth, and chaos. Due to the variable nature of change, people may hold subjective definitions of what "change" typically means. Across four studies, we examine the possibility that there are meaningful individual differences in the dominant subjective definitions people hold about the nature of change. Study 1 and 2 investigated the spontaneous associations participants make when asked to think about change, and found that holding a positive or negative general view about change (as measured by the Nature of Change scale, developed by the researchers) predicts the valence of self-generated associations. Studies 1 and 2 also demonstrate that people with an implicit entity theory of change (believing that people largely cannot change) report more negative and less positive dominant definitions of change than incremental theorists who believe people's attributes are changeable. Study 3 expands on this finding to demonstrate a link between beliefs about the Nature of Change and beliefs about the role of effort in attributions of success. Participants who believe change is positive, predictable and controllable are more likely to believe that success is a product of effort than participants who believe change is negative, unpredictable and uncontrollable. Definitions of change predict success attributions over and above people's implicit incremental or entity theories, which have previously been shown to predict attributions. Finally, Study 4 investigates the possibility that more precise definitions of change (as improvement, decline, or random) would alter people's responses to the implicit theories scale, demonstrating that responses are somewhat contingent on definitions of change Further, change defined as improvement, decline, or random differentially predicted success attributions, which are also again predicted by people's Nature of Change definitions. Overall, the current set of studies demonstrates that individual differences in

people's reactions to change are important to consider and may be as dynamic and diverse as

change itself.

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At company X, the CEO places a poster on the bulletin board stating "stay tuned, big change is coming." Jim, who works at the company, thinks this is great. For Jim, change means the opportunity for growth and could mean a new promotion. However, when Jim tells Jane, her face falls. Jane has always felt that change means a lack of control and uncertainty about the future. She thinks that the change might mean job cuts or less holiday pay, and mournfully considers whether she should get a start on cleaning out her desk.

As the Greek philosopher Heraclitus professed, "the only thing that is constant is change" (Plato, *Cratylus)* - and people encounter talk of change and signs of it very frequently. People talk of changing times, changing jobs, changing partners, and changing oneself. However, the word 'change' itself can mean many different things. For example, the Merriam-Webster dictionary is rather circumspect in defining the nature of change, defining change as "to make, or become, different." However, the different interpretations of change are left out of that definition. Learning that something has 'changed' does not clarify if the change was improvement or decline, random or predictable, inside or out of one's control. Just as Jim and Jane's reactions to the same cue diverged so dramatically, we suggest that people may interpret such messages very differently depending on their subjective definitions of abstract terms such as 'change'. For Jim, the sign advertising change was a cause for celebration, indicating that an exciting and positive time was coming up. The message had very different implications for Jane, who defines change as something more worrisome. These initial reactions may well translate into different potential behavioural consequences, for example seeking to approach opportunity or to focus on maintaining stability (Liberman, Idson, Camacho, & Higgins, 1999).

To be sure, there may be contexts when the interpretation of 'change' is clear - hurling an accusatory "you've changed" at a partner strongly suggests negative change (at least from the

accuser's perspective); a New Year's resolution of 'big changes ahead' implies an optimistically

anticipated upward trajectory. Context provides informational cues that can guide interpretation

of ambiguous terms such as change (Reicher, 2004; Haslam & Turner, 1992; Godden &

Baddeley, 1975). However, there may be times when change is invoked but the meaning of the

word is not clear from context. In these situations, people may hold systematically different

interpretations of 'change', perhaps believing that change is either a predominantly positive

force, like Jim, or a negative one, like Jane. Further, it may not be obvious to people that their

view of change is not shared by all. People find it difficult to intuit that people may hold

attitudinal differences that fundamentally differ from their own views (VanBoven & Lowestein,

2005; Ditto & Koleva, 2011). As a result, when people talk about change, they may assume, at

least initially, that other people are defining change in a similar way that they are. By failing to

take into consideration potentially diverging definitions, conversations around change may suffer

from serious miscommunication.

The central aim of this research is to examine people's spontaneous and dominant

definitions of change: do people really differ in how they react to notions of 'change'? The

second aim of the research is to examine a setting in which these divergent definitions of change

may have implications when respondents report their beliefs about people's ability and

possibility to 'change' their attributes.

Disentangling Multiple Meanings

The notion that a word can invoke multiple meanings has been studied in many fields.

Memory researchers have investigated how placing words within distinct contexts can prime

participants to react quickly to related cues. For example, the word "container" could invoke a

range of mental images and the meaning ascribed to the kind of "container" depends on the

context. Being presented with the phrase "putting juice in the container" primes participants to

respond quickly to the word "bottle," whereas being presented with "putting apples into a

container" primes participants for the word "basket" (Anderson & Ortony, 1975). In memory

research, the context pulls for distinct meanings that are contained within the same word, in this

case 'container.'

The construal literature in psychology has investigated how subjective interpretations or

construals affect perceptions of interactions or issues (Griffin & Ross, 1991). For example, if

John sends a text message to Anna and she does not respond for several hours, John's subjective

construal of the situation may be that Anna's lack of response indicates that she is mad at him

when, in reality, she is simply busy with meetings at work. Personal attitudes may contribute to

subjective construals as well. A conservative platform on reducing money towards healthcare

could be seen by an economic conservative, who puts finance first, as a smart decision; cutting

back on public spending could save money during a recession. However, a social liberal, seeing

social justice as the main priority, may see a similar healthcare cut as the product of wealthy

politicians trying to put the economy ahead of social services. Political opponents use their

subjective construals of the situation to inform, or confirm, their opinion, limiting their ability to

see the issue from another perspective (Robinson, Keltner, Ward, & Ross, 1995).

Subjective construals contribute to the complex nature of human behaviour. People tend

to believe that their subjective construals represent the objective and true reality. This

phenomenon is called "naive realism," meaning that people are often overly confident that their

subjective construal of reality is the truth for everyone (Griffin, Dunning, & Ross, 1990).

Further, although people believe that they are objective in their experience of the world, they

believe that others are swayed by subjective and biased opinions (Robinson, Keltner, Ward, &

Ross, 2004). For instance, a conservative may believe that a cut to healthcare spent is objectively

the best decision and that liberals are too biased by their socialist agenda to see the economic

sense in cutting back on public spending. Thus, subjective construals present a double-edged

sword: interpreting the world in a subjective way and, further, believing that one's subjective

construal is the objective reality for everyone.

        In several fields, such as linguistics and sociology, the quandary of multiple meanings is

known as polysemy. Polysemous words (words that can be *interpreted* in multiple ways even

when referring to essentially the same concept) can be distinguished from homonyms, which are

cases where the same spelling of a word contains *entirely* different meanings (e.g., "hail" can

indicate both icy precipitation and flagging down a cab; Utt & Padó, 2011). Polysemy refers to

the capacity of words or constructs to contain multiple and even competing meanings, not

entirely distinct meanings as homonyms have, and are interpreted by the individual in a way that

resonates with their personal worldview (Bouchard, 2017). In sociology, polysemy is used in

relation to the subjective interpretation of abstract national values. Different members of a group

or country may define the specifics of their abstract values, such as liberty or equality,

differently, leading to different assumptions about the actions and conditions necessary to

achieve these values (Bouchard, 2017; Honko, 1972). National values are intentionally

polysemous, as they unite individuals on an abstract idea or value without requiring a consensus

on their exact definitions.

        The word 'change' is polysemous in that it can be interpreted as either, for example,

'improvement,' or 'chaos.' The word 'change' is actually itself also a homonym: it can reflect

the dynamic process of becoming different, or it can refer to the entirely distinct concept of

money: nickels and dimes. However, abstract and polysemous concepts like 'change' (the

dynamic process) present a nuanced challenge. Here, the multiple potential definitions of 'change' are not the product of objective and equally true meanings, like with homonyms, but are due to how the construct resonates distinctly and subjectively with each person. How are different people interpreting the meaning of 'change'- good, bad, chaotic, orderly? Even if they acknowledge the idea that the word can have multiple meanings, does one perspective on change come most quickly to mind?

As evidenced by past research on construal and polysemy within psychology and other disciplines, subjective interpretation has been studied extensively in some contexts. Yet, in other areas of research its implications have gone unconsidered. Consider first the consequences of misunderstanding how participants might interpret a key construct. Although scales are sometimes intentionally vague in order to capture multiple interpretations, the researcher may assume that participants are employing a similar definition to their own in responding to the scale items. If a researcher is assuming the participant is defining a key construct in one way, when in reality the participant is thinking something quite different, the researcher's interpretation of the participant's response may lead to spurious conclusions about findings of research. For instance, if a researcher assumes that 'change' indicates improvement, they may ask a question like "how much can people change?" assuming the participant will understand "change" to mean "improve." As a result, they may miss something important about how Jane, who thinks change is negative and chaotic, is responding to scale items asking about change. If Jane responds "not much" to the question "how much can people change?", the researcher may think that Jane does not endorse the idea of improvement when, in reality, she might be avoiding the uncertainty she associates with change.

Research on cognitive aspects of survey methodology posits that a major flaw in survey design is the assumption that respondents' understanding is in line with the researcher's intent (Schwarz, 1999). Using ambiguous language diminishes the researchers' ability to precisely interpret the nature of their results and can lead them to spurious conclusions. By assessing meanings of key constructs, such as, in this case, 'change', researchers may be better equipped to interpret complex and meaningful data.

Implicit Lay Theories of Change

One specific methodological context where subjective meanings of change may matter is in the extensive literature on implicit theories of change (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Chiu, Hong, & Dweck, 1997). People hold implicit lay theories of change or stability, which reflect their beliefs about the degree to which change is possible: are people's characteristics essentially fixed and static or can they be understood to be malleable? The literature on lay theories demonstrates the range of consequences that stem from believing that change is either possible (incremental beliefs) or largely impossible (entity beliefs). Although people can possess knowledge informing both sets of beliefs (for instance, "leopards cannot change their spots;" yet everyone can "turn over a new leaf"), people tend to generally endorse either incremental or entity beliefs to a greater extent (Poon & Koehler, 2008). Further, research suggests that people's dominant mindset is consequential: incremental and entity theorists react differently to failure or setbacks, given that these experiences have different implications for a person who can or cannot change their future outcomes (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013). Whereas entity theorists are more likely to attribute competence solely to natural ability; incremental theorists are likely to attribute skill to effort and hard work (Hong, Chiu, and Dweck, 1999; Ommundsen, Haugen, & Lund 2005; Yeager & Dweck, 2012).

Dweck's lay theories of change scale was a product of her work on helplessness versus mastery oriented attributions styles (Dweck, 2004). Her early work demonstrated that beliefs about the possibility to enhance personal traits or abilities are rooted in a belief that the individual had the power, or the control over the situation, to enhance them. The lay theories items (e.g., "people can change even their most basic characteristics") are intended to imply a sense of controllability over the situation, such that people have *the power* to change.

Research on lay theories of change has demonstrated that lay theories can be successfully manipulated by providing persuasive information about the validity of one view over the other; these mindsets may also be fluid depending on the individual's motivations (Gervey, Chiu, & Hong, 1999; Burnette, 2010; Burns & Isbell, 2007; Leith et al., 2015). Blackwell, Trzesniewski, and Dweck (2007) demonstrated that recurring interventions enforcing the understanding that hard work can improve test scoring ability (tied to incremental belief) can lead to an increase in overall effort, wellbeing, and GPA amongst school age children and youth. Further, implicit theories can shift strategically in order to accommodate unfavourable information into pre-existing beliefs. For example, after a failed test, a person may be inclined to adopt an incremental view, because believing they can change and escape future failure is preferable to assuming they are stuck in a fixed state of low intelligence. An entity view is more palatable after success because it holds the promise that such successes will endure (Leith et al., 2015). People also shift their mindsets when evaluating others: when faced with their supported politicians' past mis-steps and gaffes, they insist people can change; yet when they encounter similar blunders committed by opponents they suggest that character is fixed (Leith et al, 2015).

In Dweck's implicit lay theories of change scale, the word 'change' is used often, without defining what 'change' means. Although Dweck intended the items to indicate controllability, it

remains unclear how people really define the concept of 'change' (Dweck, 2012). Dweck's implicit theories of change scale items are phrased fairly generally, for example "generally, people cannot change even their most basic characteristics" or "people can change their basic level of intelligence" (Hong, Chiu, & Dweck, 1995; Dweck & Henderson, 1989). However, the scale is often at least implicitly interpreted by the researchers (perhaps especially in the education literature) to capture whether or not participants believe they can *improve* (Dweck, 1986; Dweck, 2007; Yeager and Dweck, 2012). 'Improvement' is merely one definition of change. When participants are reading the scale, it is possible that some participants are indeed reflecting on their capacity for improvement, while others may be interpreting the scale items as indicating a potential for decline or for unpredictable, random or chaotic change in their intelligence or personality.

Think back to the example of Jim and Jane. If Jane, who generally believes that change is a sign of bad times ahead, reads an implicit theories scale item such as "the kind of person someone is, is something very basic about them and it can't be changed very much.", she may think this sentiment is positive and desirable- she may prefer a stable level of a trait as it indicates to her a state of certainty and comfort. For Jim, who thinks change is generally positive, the notion that people do not change may seem undesirable, while an item like "people can change" heralds all of the potential of continued improvement and growth. In other words, if Jim and Jane have different fundamental assumptions about the nature of change, their responses to questions about whether people can change could reflect those underlying assumptions. The implicit theories literature examines beliefs about the possibility of change, but has yet to expand the research to investigate how subjective definitions about the nature of change could impact interpretations of the scale. Perhaps subjective definitions of change (as good or bad, predictable

or chaotic) are influencing responses to Dweck's implicit theories items and the researchers'

interpretation of what scale responses mean might not fully align with all participants'

interpretations.

The Nature of Change Scales

To our knowledge, very little research has examined how people interpret the notion of

"change" on a survey item. In a recent exception, O'Brien and Kardas (2015) explored the idea

that participants may interpret the very idea of "change" differently depending on the object of

change. When asked to reflect upon change that had happened in their personal lives, participants

reported more instances of positive than negative change. Participants rated how much they had

changed in their past year, five years, or ten years, and were also asked to indicate how many

positive, negative, and neutral changes had occurred. Only the number of positive changes listed

by the participants was related to how much they thought they had changed overall. Of course,

this by itself does not mean they define change as improvement- they could simply have more

favorable experiences available in memory. However, other findings also point to a tendency to

define change as improvement, at least in the context of the self. In another study, participants

participated in a speeded task and were asked to rate their reactions to words on a scale from

mostly negative to mostly positive. Participants reacted to "to change", "to be stressed" (negative

control word), "to be relaxed" (positive control word), and "to be gilberted" (neutral/nonsense

control word). Further, participants were told to orient their mindsets to thinking about either

themselves or their friend. Participants demonstrated a more positive reaction to "change" than to

a neutral word, but only within the context of self. The positive reaction to "change" within the

context of "self" indicates that participants are selective in their definitions of change; the self is

a context in which change is more often defined in one specific and positive way. In the O'Brien

and Kardas paper, the self-referent cue may be activating a knowledge network of positive

change, at least on average and compared to the network activated when people think of 'others'

and 'change.' The researchers did not examine individual differences in those definitions of

change, however. Further, when change is presented without context (not centered around the

self), the informing knowledge network may not necessarily sway towards positive, or negative,

change.

   The current research is aimed at developing and validating a scale to understand people's

subjective definitions of change. Given that the implicit theories scale, as one example, uses the

word "change" without providing a discrete context, perhaps incremental and entity theorists are

defining change in systematically different ways. When given ambiguous cues, participants may

engage in a pragmatic process that brings forward past experiences and beliefs, interpreting

change in whichever way resonates with their subjective orientation towards the world (Strack,

Schwarz, & Wanke, 1991). As past research has failed to take into account the variable nature of

people's dominant beliefs about change, we believe it is important to differentiate between

people who are reading "change" as "chaos" and those who are looking forward to a predictable

kind of growth.

   As change is variable in nature, it may mean that people hold simultaneous and even

competing definitions of change. The knowledge activation literature acknowledges that people

may hold knowledge of multiple interpretations and competing beliefs (Poon & Koehler, 2006).

For example, people may simultaneously have stored knowledge consistent with the notion that

people change, and that people don't change; the beliefs they express as lay theories may be the

ones activated chronically or contextually. Similarly, although people may be able to recognize

that competing beliefs about change (that it can be good and bad, ordered and chaotic) are

legitimate, we propose that people will often hold a dominant set of change-related associations that tends to be more active than competing beliefs, given either the associated context or the person's general worldview. Thus, the central goal of this thesis is to investigate the definitions of change people provide when change is presented without a particular context, which arguably reflect their most dominant beliefs about the construct. A secondary goal is to examine how a better understanding of people's divergent definitions of change may inform other related research in which the concept of "change" plays a central role.

To understand subjective definitions of change, we constructed a scale including three factors relevant to change beliefs. The Nature of Change (NoC) scale asks participants if change is negative or positive, controllable or uncontrollable, and predictable or unpredictable. Although respondents may possess knowledge informing them that change can be both positive and negative (Poon & Koehler, 2006), they may possess a dominant response that guides their spontaneous interpretations of the nature of change. We hypothesize that people hold a dominant view of the nature of change that predicts other attitudes towards change as well as attitudes towards change-related behaviour, such as beliefs in the value of effort. In the following set of studies, we investigate people's assumptions about the nature of change and attempt to integrate subjective definitions of change into the literature surrounding the influence of change beliefs on general attitudes and behaviours.

Study 1

The main purpose of Study 1 was to develop a scale measuring Nature of Change beliefs and to test its reliability and begin to assess validity. The questions and proposed scale in Study 1 sought to capture spontaneous and dominant definitions of change and to see whether people respond to change in systematically different ways.

First, we asked participants open-ended questions directed at their spontaneous definitions of change. Given our overarching hypothesis that participants hold subjective definitions of change, we sought to capture these definitional differences by asking participants to generate change-related words. After the open-ended questions, we had participants respond to a list of proposed NoC items. The items were generated by the researchers and touched on three factors: valence of change (positive or negative), predictability, and controllability. In addition, we tested implicit theories of change to investigate whether spontaneous definitions of change are related to implicit lay theories of change (see Appendix B).

Overall, we hypothesize that participants will demonstrate a dominant spontaneous definition of change. This should be evident both in open-ended definitions and in response to the Nature of Change (NoC) scale. As one test of scale validity, we predict that the coded self-generated change words will correlate with proposed NoC scale items. In addition, we speculate that the belief that change is generally positive will be at most mildly negatively correlated with the belief that change is generally negative as we expect that participants will vary in the tendency to hold one belief, the other, or both in tandem. Most people may have both associative networks, since believing one thing (change is good) does not necessarily preclude believing the other (change is bad), and therefore some may endorse one belief over the other, endorse both, or neither since we assume nearly everyone has knowledge of both possibilities.

A final purpose of Study 1 is to evaluate whether there is a relationship between NoC beliefs and implicit theories. It is possible that people's beliefs about the nature of change as good and controllable or bad and uncontrollable (NoC beliefs) will be unrelated to their belief that people can change (implicit theories). However, it is also possible that incremental and entity theorists interpret the dominant features of change in systematically different ways. Study

1 will help to shed light on what relationship, if any, exists between subjective definitions of change and the perceived possibility of change.

Method

      Participants. Two hundred and fifty-five American residents recruited from Amazon's Mechanical Turk database participated in our online study. Participants who failed more than one of a potential four attention checks were excluded from analysis, leaving a final sample of 250 participants (46% female, M_{age}=36.77, range 19-88). Due to the exploratory nature of the experiment, we used a conservative rationale for attention check exclusion in order to reduce the effect of attrition or carelessness on our results (Meade & Craig, 2012).

      Design and procedure

      Secondary variables. The study was correlational in design with the intended purpose of scale development. Participants first filled out the demographic survey followed by personality measures that included the ten-item Rosenberg's self-esteem scale (Rosenberg, 1965), a four-item perceived control scale (Levenson, 1973), the 15-item need for cognitive closure scale (Webster & Kruglanski, 1984), a single-item measure of life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985; Lucas & Donnellan, 2012), and the eleven-item regulatory focus questionnaire (Higgins et al, 2001) (see Appendix A). The measures in the personality section were included to shed light on how NoC beliefs are connected to other attitudes and behaviours that share some conceptual overlap. We did not have specific hypotheses about these variables.

      Participant generated words. In order to test the hypothesis that participants have dominant knowledge networks surrounding change, we first asked participants open-ended questions aimed at their spontaneous reactions to change. Among three filler items, participants were asked to list the first five words that came to mind when they think of the word "change"

(question 1), to list five synonyms or related concepts that came to mind when they think of the word "change" (question 2), and to fill in the phrase "when people change, it means they have…" (question 3). At the beginning of the block, participants were instructed to not overthink their responses as there was no "correct" answer, and to just write the first thing that came to mind (see Appendix C).

To investigate the nature of participant-generated words, we had three coders rate the participant-generated words on whether they were 'positive,' 'negative,' 'unpredictable,' 'predictable,' 'controllable,' or 'uncontrollable'. The coders coded how many of the words provided by the participants indicated each factor (bad/good, unpredictability/predictability, uncontrollability/controllability). For example, "plan" was coded as controllable, "better" would be coded as positive, "uncertainty" would be coded as unpredictable, etc. Coders were told to rate the words as objectively as possible, such that words like 'different' or 'alter' would be coded as neutral. Codes were not mutually exclusive (for example, 'self-improvement' would be positive and controllable).

Self-generated words for which interpretations of change that were entirely out of the scope of the research question ("coins," "Obama," "laundry," etc.), were coded as absent from any of the factors of interest.

In this study, coders were instructed to read all of the words listed by participants in response to each question, and indicate how many fit into each coding category. As a result, each participant had a coded score for how many words (out of 5) they listed that pertained to each category. Because of the nature of this coding approach, the best method for assessing inter-rater reliability was somewhat uncertain. Because each word was not coded separately, it was impossible to code % agreement overall. It also did not make sense to calculate percent

agreement by category: if one coder counted 4 items and another counted 5 in a category, this could get counted as 'disagreement' even though the scores overlap considerably. Therefore we opted to treat the tally (ranging from 0-5) as akin to a rating scale (e.g., rate positivity from 0-5). Accordingly, to test inter-rater reliability, we calculated a Cronbach's alpha for each factor with each of the three coders' ratings as an item (three items in total, one representing each coder's score). We argue that the number of self-generated words indicating a particular factor may indicate higher levels of that construct. We recognize the limitations of our coding scheme and encourage prudence when interpreting the following results. For question 1, the alphas for the 'positive' and 'negative' code were strong ($\alpha=.77$, $\alpha=.90$, respectively). For question 2, the alpha for 'positive' was moderately strong ($\alpha=.68$) and the alpha for 'negative' was strong ($\alpha=.88$).

Valence is the factor of central interest, but coders also evaluated predictability and controllability. However, most of the alphas were considerably lower for these categories. The predictable, unpredictable, and uncontrollable factors were very low ($\alpha<.4$) for both question 1 and question 2. Only the category "controllable" showed reasonable reliability ($\alpha=.74$ in Study 1, $\alpha=.77$ in Study 2) but we decided to exclude it from our results section as we are unable to run analysis on the other peripheral factors that had low reliability (unpredictability, predictability, and uncontrollability). We argue that the 'positive' and 'negative' factors may often also encompass sentiments of predictability and controllability (e.g. 'turmoil' could be negative and unpredictable) and are therefore strong representations of participants' beliefs about change.

Coding for question 3 ("when people change, it means they have...") did not provide conclusive results. Although some responses were objectively directional ("it means they have improved", "things are for the better"), the majority of responses were objectively neutral on the factors of interest, as rated by our coders (e.g. "it means something is different," "the situation

has changed"). Of 250 participants, only 38 responses were coded as 'positive' and 7 as 'negative', whereas the majority (the remaining 210) were coded as 'neutral'. Although there may be consistent themes within participant responses, no systematic patterns of beliefs surrounding change were captured by our coding scheme. We have included the correlations with other key variables in Table 2 but, due to the lack of variance, we did not analyze the responses for question 3 further.

Nature of change scales. Further, participants were presented with a preliminary scale measuring dominant definitions of change. On a six-point Likert scale (from strongly disagree to strongly agree), participants responded to 41 statements that indicated potential definitions of context-free change (e.g., "when things change, it usually reflects upward growth or improvement"; "when things change, it is often for the worse"; "change usually means people are being inconsistent or unpredictable"). Scale items were inspired by past literature on resistance to change (Oreg, 2003), perceived valence of change (O'Brien & Kardas, 2015), and controllability of change (Tullett, & Plaks, 2016), but none of these literatures sought to assess the general tendency to define change in a particular way. Items were drafted to express each of the proposed subscales (un/predictability, un/controllability, good/bad). The three subscales conceptually cluster together, and are intended to be aggregated into two larger scales: the positive Nature of Change scale (change is predictable, controllable, and good) and the negative Nature of Change scale (change is unpredictable, uncontrollable, and bad). The three subscales are likely to be positively correlated in general: when change is controllable, it will often also be positive and predictable. However, there may be instances or specific contexts in which these three factors do not align. For instance a change could be unpredictable and uncontrollable but still positive (a lottery win, a surprise party). One can imagine other situations like job-seeking

where the job seeker may feel that they can control many aspects of the process, such as their resume and manner at the interview, but the outcome still remains unpredictable to some extent. The purpose of this thesis is not to investigate these specific contexts, but rather more general views of change. As a result the subscales are somewhat brief, and we will generally treat them as a combined measure. Future research could focus on contexts where these subcomponents diverge, and might strive to create a longer scale with more reliable subscales that can more readily be used as separate measures. In the current thesis, however, we investigate general views about change, an instance where the three subscales are likely to be positively correlated, and will most often use the scale as a whole.

Our initial scale also included items on stability (i.e. if stability is good or bad), although we suspected these items might not hang together with change items because past literature has demonstrated that stability is experienced as a positive state (Feldman, 2003; Kernis & Waschull, 1995), likely independent of beliefs about change. Past literature demonstrates that people generally embrace stability (perhaps regardless of their approach to change), leading us to reason that it is theoretically possible to hold separate "stability" and "change" beliefs (Kernis & Waschull, 1995). Thus, the stability items were not included in the analyses.

Implicit theories of change. After, participants responded to Dweck's general person lay theories of change questionnaire on a 6-point Likert scale, from strongly disagree to strongly agree (e.g. "everyone, no matter who they are, can significantly change their basic characteristics"; "everyone is a certain kind of person, and there is not much that can be done to really change that,") (Chiu, Hong, & Dweck, 1997).

       Supplementary nature of change items. Finally, we had participants answer additional

items asking about the nature of social change. These items are for purposes outside of the scope

of the current thesis and will not be discussed further.

Results

       Reliability analyses. To examine the reliability of the scale items, we ran reliability

analysis on the full set of items for each of the subscales: predictability (4 items, Cronbach's α

=.73), good (8 items, Cronbach's α=.88), controllable (6 items, Cronbach's α=.77),

unpredictability (6 items, Cronbach's α=.72), bad (6 items, Cronbach's α=.85), and

uncontrollable (4 items, Cronbach's α=.69). Together, the positive NoC scale had a reliability of

α=.88 (18 items) and negative NoC scale had a reliability of α=.88 (16 items) (see Appendix B).

       With strong reliability, we sought to reduce the scale further in order to have a succinct

scale to use for further investigation. In order to maintain a more conceptually coherent scale, we

deleted items that touched on people's preference for change instead of subjective definitions

(such as "overall, I like when there is change in my life"). By the preference for change

exclusion criteria, four items were deleted. Further, we deleted items that were close duplicates.

Originally, the duplicates had been included so that we could test the precise wording of ideas

about change, in order to find the best scale items. However, creating a final scale, these items

were somewhat redundant. Excluding the duplicate items reduced our Cronbach's alphas

slightly, however the original alpha levels were slightly misleading as the robustness was in part

due to the duplicates bolstering the internal reliability. By the duplicate exclusion criteria, we

eliminated five more items. From the original items, the following number per subscale was

deleted: 6 'good' (from an original eleven), 0 'predictable' (from an original four), 1

'controllable' (from an original five), 5 'bad' (from an original nine), 0 'unpredictable' (from an

original seven), and two 'uncontrollable' (from an original four). Of note, the 'unpredictable'

subscale (7 items) makes up approximately half of the negative NoC scale. The weight afforded

to the 'unpredictable' factor is not of concern for the researchers, as we argue that there is

substantial amount of conceptual overlap between what makes change 'bad', 'unpredictable',

and 'uncontrollable; ' many items reflect more than one aspect to some degree. The items

designed to primarily measure the 'uncontrollability' subscale were more limited (2 items). The

other 2 items were close duplicates, therefore the two items were eliminated. Further

'uncontrollability' items are thus added in future studies.

For the following studies, we use the composite NoC scales and do not focus on the

individual subscales (bad/good, un/predictability, un/controllability). Although we argue that

each individual subscale represents a conceptually distinguishable and important facet of change

beliefs, the main focus of this thesis is to understand how general negative and general positive

views of change (that change is good/predictable/controllable or

bad/unpredictable/uncontrollable) are related to other attitudes and beliefs and this is best done

through investigating these highly correlated dimensions of change together. Further, the

subscales we have created have not been systematically developed and tested with the intention

of treating them as separate subscales (e.g., limited number of items per subscale, somewhat

lower reliabilities for subscales than for the full scale in aggregate, limited validation of each

separate subscale). Future research could investigate questions how perceptions of

controllability, predictability, and valence of change might uniquely predict other key

constructs.[1]

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[1] Several factor analyses were conducted to explore whether each of the subscales consisted of separate factors. In the exploratory factor analyses (using an oblimin rotation for non-independent factors), there were three factors of interest with significant eigenvalues. The subscale items did not load onto the factors in a systematic way, and the clearest factor loadings suggested valence (change is good vs bad)

The final scales were a 14 item positive Nature of Change measure (*M*= 3.67, *SD*=.66; Cronbach's α= .86) and a 13 item negative Nature of Change measure (*M*= 3.21, *SD*=.72; Cronbach's α=.85).

The final negative and positive NoC scales were not significantly correlated (*r* (249)=-.07, *p*=.245), as shown in Table 1. The lack of correlation between the two scales indicates orthogonality (at least in this sample) and supports the notion that people may hold both beliefs to varying degrees: some people might be high in both, others low in one and high in the other, and so on. To better understand the distribution of the positive and negative nature of change items, we calculated a difference score (positive NoC - negative NoC), which demonstrated that participants are agreeing slightly more with the positive NoC items (*M*=.47, *SD*=1.02). The average difference score was slightly positive, indicating that participants are agreeing slightly more with the positive NoC items on average. However, difference scores ranged from -3.51 to 4.10, suggesting considerable individual difference variability in the degree to which positive associations dominate negative ones or negative interpretations dominate positive ones. Thirty percent of participants had a negative difference score (indicating greater negative than positive NoC beliefs), forty-one percent had a score between 0.00 and 1.00, and thirty-nine percent had a score greater than 1 (indicating greater positive than negative NoC beliefs). For a full distribution of the difference scores, see Figure 1.

Coding participant-generated words. To investigate the relationship between positive and negative self-generated words and responses to our NoC scales, we conducted correlations

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was the dominant dimension of interest, with controllable and predictable items also loading onto the expected valence factor. A confirmatory factor analyses was conducted, restricting the number of factors to two. We found that negative NoC items (which included bad, uncontrollable, unpredictable) loaded on the first factor and positive NoC items (including good, controllable, predictable) loaded on the second factor. The two factor analyses mentioned can be found in Appendix G.

between the coding results and the NoC scores. The results for question 1 and question 2 are summarized in Table 2. Overall, we found that spontaneous word generations corresponded with participants' scores on Nature of Change. Those who scored high on negative NoC were more likely to spontaneously generate negative change-related words (such as terrible or scary) ($r(249)=.29$, $p<.001$) and fewer positive words ($r(249)=-.19$, $p=.002$); and those with higher positive NoC scores generated more favorable definitions of change (such a growth, excitement) ($r(249)=.28$, $p<.001$) and fewer negative words ($r(249)=-.21$, $p<.001$). The findings suggest that the NoC scales appear to validly capture the dominant positive or negative reactions that come to mind.

For question 2 (to list five synonyms or related concepts that came to mind when they think of the word "change"), participants who strongly endorsed the belief that change is negative generated fewer positive words ($r(249)= -.18$, $p=.005$) and generated more negative words ($r(249)=.15$, $p=.015$) (Table 2).

Nature of change and implicit theories. Next, we sought to examine whether people's spontaneous definitions of change were related to their implicit theories about whether change is possible. We analyzed the relationship between spontaneous definitions of change and implicit theories which asks questions about change without defining its nature (i.e. "people can change even their most basic characteristics"), to see whether subjective definitions of change were related to other beliefs surrounding change. We found that people who believe that people cannot change (entity theorists) were less likely to generate positive words ($r(249)=-.19$, $p=.002$) and were more likely to generate negative words ($r(249)=.22$, $p=.001$). Participants who reported the highest endorsement of entity theory reported that the words coming to mind when they think about change included words such as 'horrible' and 'dangerous' whereas participants with the

most incremental beliefs (people are malleable) reported words such as 'growth', 'excitement', and 'choice'. Consistent with findings for self-generated change associations, the relationship between implicit theories and the valence of self-generated words appears to indicate that people who have different lay theories about whether change is *possible* are also defining "change" itself in systematically different ways. Future studies will investigate this question further.

Further, we tested the hypothesis that Nature of Change beliefs are correlated with implicit theories (Table 1). The results indicate that participants who are high on positive Nature of Change report being less entity theorists ($r(249)=-.24$, $p<.001$). In contrast, those who endorse a high negative Nature of Change reported being significantly higher on entity theory ($r(249)=.35$, $p<.001$). Given that the theoretical underpinnings of implicit theories are rooted in the assumption that change beliefs are essentially about controllability, we were interested to see whether the relationship between NoC beliefs and implicit theories of change was driven specifically by the controllability subscales in the NoC scales. To evaluate this, we ran zero order correlations between the subscales and implicit theory beliefs. The summary of these correlations can be found in Table 3, and will not be repeated here in full. Entity beliefs were related to strong agreement that change is uncontrollable, $r(249)=.38$, $p<.001$, and low endorsement of the belief that change is controllable, $r(249)=-.24$, $p<.001$. However, strong entity beliefs were also equally related to believing that change is bad, (not) good, unpredictable, and (not) predictable. The relationship between entity beliefs and various beliefs about change suggests that entity beliefs are not solely tapping into beliefs about the controllability of change and, more importantly, the NoC scales are capturing a unique measure of change beliefs.

Finally, the implicit theories of personality scale specifically asks about whether people can change. Since the NoC scales contain items that reference what happens when *people* change

as well as when *things* change generally, it is possible that the relationship between implicit theories and NoC beliefs could be driven by the "people change" items and the "things change" items could be tapping into something quite different. We ran zero order correlations to examine the relationship and found that entity beliefs show equally strong correlations to both the 'things change' and the 'people change' items (see Table 3).

Nature of change and exploratory measures. Further correlations were run between NoC beliefs and the exploratory measures to evaluate where NoC beliefs are related to other conceptually relevant psychological attitudes (see Table 1). People with more positive NoC beliefs reported significantly higher self-esteem ($r(249)=.35$, $p<.001$), perceived control ($r(249)=.21$, $p=.001$), and promotion orientation ($r(249)=.21$, $p<.001$). Those with higher negative NoC beliefs also reported significantly lower self-esteem ($r(249)=-.28$, $p<.001$), perceived control ($r(249)=-.24$, $p<.001$), prevention orientation ($r(249)=-.26$, $p<.001$), and promotion orientation ($r(249)=-.31$, $p<.001$). Those with more negative NoC beliefs reported higher Need for Cognitive Closure ($r(249)=.33$, $p<.001$). Further, we speculated that NoC could be related to people's feelings of economic stability. People who reported more household economic uncertainty reported less positive NoC beliefs ($r(249)=-.14$, $p=.026$) and significantly more negative NoC beliefs ($r(249)=.23$, $p<.001$), whereas feelings that economic needs were met was positively related to positive NoC beliefs ($r(249)=.26$, $p<.001$). The relationship between NoC beliefs and personal economic situation may indicate that the (in)stability in personal situations may affect an openness to change.

Discussion Study 1

The first purpose of Study 1 was to create a Nature of Change scale, and to test its validity by examining people's spontaneous and subjective definitions of change, as well as to

examine its link to other conceptually related exploratory variables. As expected, the NoC scale

predicted people's spontaneous definitions of change and related in largely expected ways with

conceptually overlapping variables.

Further, we found a connection between lay theory beliefs and spontaneous definitions of

change. In Study #1, we found that people who held stronger entity beliefs were less likely to

believe that change is good (and controllable, predictable) and more likely to believe that change

is negative (uncontrollable, and unpredictable). The implicit lay theories of change scale does not

provide a context for change (e.g., "the kind of person someone is… can't be changed very

much"), therefore relying on participants to define 'change' for themselves. The current research

demonstrates a relationship between the belief that change is possible and the belief that change

is positive, as well as the belief that change is largely not possible and the belief that change is

negative. Although we have not determined a chain of causality, it may be important to

understand the full network of 'change' beliefs in interpreting the implicit theories of change

scale. It may be that entity theorists when they endorse the view that attributes generally do not

change, are unlikely to be bringing to mind the kind of change Dweck typically envisions

(controllable improvement). Instead, they may be thinking about change as random,

unpredictable change or decline, and subsequently rating such undesirable change as impossible

or relatively unlikely to occur. Further, we have found that, despite the origins of Dweck's lay

theories of change in the learned helplessness literature, the relationship between NoC beliefs

and implicit theories is not solely driven by beliefs about whether change is controllable. Given

the equally strong correlations with the other factors (positivity and predictability), Study 1

demonstrates that beliefs about change, as well as beliefs about the possibility of change, is more

complicated than simply whether or not change is controllable.

We found that self-generated words in response to the word "change" suggest the validity of the scale, as the scale accurately predicted the directional nature of self-generated change related words. Further, the self-generated words seem to demonstrate a relationship between definitions of change and implicit lay theories. However, participants may be rating their words differently from our coders. Having coders rate the positive or negative nature of participant generated words is slightly inconsistent with our general assumptions about the variability of definitions of change: how can we be certain that the coders' subjective interpretation of their words is the "correct" interpretation, or at least in line with the perceptions of our participants? For example, for the third open-answer question ("when people change it means they have…"), participants gave responses such as "became different", which were coded as neutral by our coders and led to a lack of variability in our coding scheme. However, perhaps participants felt that "become different" was either positive or negative, depending on their subjective definitions of change. By asking participants to rate self- and researcher-generated words, Study 2 attempts to further the findings of Study 1 by allowing participants to be the coders for their own self-generated words, shedding light on how individuals subjectively view the valence, predictability, and controllability of their dominant change-related knowledge network.

Study 2

Study 2 seeks to further validate our Nature of Change scale by examining how it predicts participants' ratings of self- and researcher-generated words. Recall that in Study 1 we asked participants to generate words that immediately came to mind when thinking about 'change'. Although inter-rater reliability was reasonable for some categories, the rater's coding may not be the best way to determine whether the participant-generated words were viewed as positive or negative to the participant. Participants may imbue their self-generated words with

valence that is not detectable by the coders. For example, two participants may both list the word

"different", and one could be thinking it is positive whereas the other feels that "different" is

negative. Thus, to build on Study 1, in Study 2 we ask participants to rate their self-generated

change-related words. Further, we asked participants to rate a series of experimenter-generated

words that are broadly related to change.

First, we hypothesized that participants would code both their self-generated words and

researcher-generated words in accordance with their definitions of change. Essentially,

participants who score high on negative NoC beliefs would rate their self-generated words as

negative, whereas participants who score high on positive NoC beliefs will rate their self-

generated words as positive. If our hypothesis is correct, the relationship between definitions of

change and subjective ratings of 'change' related words may further test the validity of the NoC

scale to the extent that those people who view change as either positive or negative are

spontaneously generating concepts that reflect these inherent beliefs. Of course, we anticipate

that spontaneously-generated words will receive different participant ratings for two reasons:

first, because people generate different actual words, and second because their NoC orientation

leads them to view even the same concepts (e.g., "different") as more positive or negative.

Participant ratings of researcher-generated change words provides a more controlled test of the

latter hypothesis (that even the same words will be defined differently).

An additional purpose of Study 2 is to further test and extend the findings in Study 1 that

implicit theories are related to subjective definitions of change. Given the relationship between

entity beliefs (change is impossible) and spontaneously defining change as more negative, we

expect that participants who are entity theorists will rate their own self-generated, and

experimenter-generated, 'change' words as more negative. If the attitude that people cannot

change is related to a systematic rating of "change" words as negative, the relationship may shed further light on how participants may be interpreting scales such as implicit theories where the nature of change is not specifically defined.

Methods

Participants. One hundred and fifty three participants were collected through the Mechanical Turk platform. One participant was removed from analysis for failing more than one of four possible attention checks, leaving a total N of 152 (51% female, M_{age}=34.10, range 20-74).

Design and Procedure. The study was correlational in nature, examining the relationship of the NoC scales developed in Study 1 and how positive or negative participants view self- and researcher-generated words.

First, duplicating the questions from Study 1, we asked participants to write "five words that come to mind when you think of the word 'change'" and, after, to "write five synonyms of the word 'change'". Unique to Study 2, participants' self-generated words were then piped into the rating block. Participants rated their ten self-generated words on positive-negative, predictable-unpredictable, controllable-uncontrollable slider scales (coded as 0-100, where 100 was positive, predictable, and controllable, respectively). We instructed participants to "go with [their] gut feeling or first impression" because we wanted to capture their spontaneous reaction to these words. People might be aware that a more "objective" definition of a world like 'surprise' does not inherently carry a negative tone, but their spontaneous response to the word may be negative. Our instructions were an attempt to indicate that people were free to express those spontaneous reactions without second guessing them.

The ratings of self-generated words allowed us to investigate how participants viewed their own ideas surrounding change. However, self-generated lists may vary in their rating for two reasons: first, because participants chose different words, and second, because they rate even similar words differently. We cannot disentangle these two effects using this method. Therefore we also sought to obtain self-ratings on an identical list of words. Participants were then given a list of change-related words (growth, improvement, develop, adapt, alter, opportunity, progress, and evolve) as well as characteristics of change (e.g. 'risk', 'random', 'inconsistent') generated by the researchers. We also included the word 'changing' as to investigate spontaneous reactions to change in a direct way. The researcher-generated words were used to complement the spontaneously-generated lists, allowing us to examine ratings on an identical list of words. For researcher-generated words, participants were asked to rate only the central dimension of valence on a 7 point Likert scale (from extremely negative to extremely positive). In an effort to keep the survey length reasonable, we did not ask participants to also rate controllability and predictability.

Participants then filled out a demographic questionnaire and some secondary measures to allow a separation between the definitions and the NoC scale. The secondary measures included Rosenberg's 10-item self-esteem scale (Rosenberg, 1965), the 15-item Need for Cognitive Closure scale (Webster & Kruglanski, 1984), and a four-item perceived control scale (Levenson, 1973).

Participants then filled out the positive NoC (Cronbach's α=.84) and negative NoC (Cronbach's α=.84) scales created in Study 1. Two uncontrollability items were added to the negative NoC scale (for a total of four uncontrollability items) in order to better capture feelings about the uncontrollable nature of change. One 'predictable' item was changed slightly from

study 1: "people really only change in predictable ways" to "people really only change in ways you would expect." We had used the word 'predictable' in the other three items and changed the word to prevent redundancy in the items.

Finally, participants responded to the implicit theories of personality scale (Chiu, Hong, & Dweck, 1997) before being debriefed.

Results

Both the positive (change is good) (*M*=3.88, *SD*=.67) and negative (change is bad) (*M*=3.27, *SD*=.70) NoC scales were found to be reliable (each with a Cronbach's alpha of .84) and thus analyses were run to test the a priori hypotheses. Unlike in Study 1, positive and negative nature of change beliefs were negatively correlated, $r(151)=-.32$, p<.001, suggesting that people who believed more that change is good were relatively less likely to believe change is bad.

To test our hypothesis that NoC beliefs were related to how participants were rating their self-generated words surrounding change, we ran a series of zero order bivariate correlations looking at NoC beliefs and positivity, predictability, and controllability ratings (Table 4). We created a mean score for participants' rating of their 10 self-generated words for positivity (*M*=66.81, *SD*=15.90), predictability (*M*=50.00, *SD*=17.29), and controllability (*M*=54.87, *SD*=16.16). Higher scores indicate higher ratings of positivity (versus negativity), predictability (versus unpredictability), and controllability (versus uncontrollability). Participants with higher positive NoC beliefs rated their self-generated words as more positive ($r(151)=.38$, $p<.001$), controllable ($r(151)=.32$, $p<.001$), and predictable ($r(152)=.38$, $p<.001$). Those with higher negative NoC beliefs rated their words as less positive ($r(151)= -.24$, $p=.003$); but negative NoC beliefs were not significantly related to rating words as controllable ($r(151)=-.11$, *ns*) or

unpredictable ($r(151)$=-.07, *ns*). Further, we created a mean aggregate of the positivity ratings for

each of the 8 researcher generated words (Cronbach's α=.90, *M*=5.46, *SD*=.89). Participants who

rated the researcher-generated words more positively showed stronger endorsement of positive

NoC beliefs ($r(151)$=.42, p<.001) and less endorsement of negative NoC beliefs ($r(151)$=-.24,

p=.003). The findings demonstrate that NoC beliefs predict people's definitions of words that

they spontaneously associate with change, as well as words that the researchers chose as

synonyms for change.

In the section with researcher-generated change words, participants rated words that

described characteristics of change ("inconsistent", "surprise" etc.). Generally, we see that

participants who believe change is bad rate the change-related characteristics as more negative

than participants who believe change is good. A full summary is available in Table 5.

Recalling our methods for Study 2, filler items were included in the researcher-generated

words section. The filler items serve two purposes. First, the filler words distracted participants

from our primary research question. Second, the filler words allow us to evaluate the

participants' positivity bias. Perhaps participants who view change words as positive may be

more likely to view all constructs in a positive light. To evaluate the potential for positivity bias,

we first looked at the correlation between the ratings for the filler items (N=13) and participants'

positivity scores for both self- and researcher-generated words. Indeed, people who had a higher

NoC good score did rate filler items more positively, and NoC negative tended to view these

words more negatively.[2] Participants who rated the filler items as positive also rating their self-

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[2] It is worth noting that several filler words were not entirely 'neutral' in that they highlighted cognitive engagement
e.g., "think", "question", and "understand." These items may overlap to a degree with constructs such as need for
cognitive control, need for cognition, etc. It could be some of the variance is accounted for by negative NoC
participants' aversion to uncertainty or less openness to experience and ideas, and hence may be less appealing due
to orientation toward change rather than a simple positivity bias. However this possibility is only speculative and
will not be considered in interpreting findings. Refer to Table 6.

generated words as more positive, $r(150)=.52$, $p<.001$, as well as researcher generated words, $r(150)=.76$, $p<.001$.

Given the high correlations between the positivity ratings for filler items and change-words, we reran the correlations for positive NoC beliefs, negative NoC beliefs, positive ratings of self-generated words, and positive ratings of researcher-generated words while controlling for the positive ratings for the filler items. Here, we are using the positive ratings for the filler items as an indicator of the participants' bias towards rating constructs as positive. Controlling for the ratings of filler items allows us to capture positive ratings of change, beyond subjective positivity biases. Controlling for positive rating reduced the strength of the relationship between positive NoC beliefs and positive ratings of the researcher generated words, however there remains a relationship between positive NoC beliefs and positive ratings of self-generated words and between negative NoC and both types of change words. A summary of the results can be found in Table 4.

As in Study 1, people who do not believe that people can typically change (entity theorists, low scores indicate incremental theory) reported less agreement with positive NoC beliefs $r(151)=-.19$, p=.018, and agreed more strongly with change-is-bad NoC beliefs, $r(151)=.31$, p<.001. People who reported a stronger entity theory rated their self-generated words as less positive ($r(151)=-.30$, p<.001) but did not rate words as more or less controllable ($r(151)=.02$, *ns*) and predictable ($r(151)=.00$, *ns*). Those reporting higher endorsement of entity theory rated the researcher-generated change words as less positive ($r(151)=-.20$, $p=.014$).

The filler secondary measures are not central to the main research question, and the correlations with NoC and implicit theory beliefs are summarized in Table 7.

Discussion

The purpose of Study 2 was to further demonstrate the strength of the dominant definitions that exist surrounding change. Study 2 offered evidence that participants' dominant views surrounding change, measured by the NoC scales, are related to their spontaneous associations when asked to think about change. Participants who believe that change is generally good rated both their self-generated change-words and researcher-generated change-words as more positive than participants who believe change is bad.

Notably, in Study 1 we found no correlation between negative and positive NoC beliefs; in Study 2 we found a negative correlation. Although we speculate that nature of change beliefs can be orthogonal (someone may hold one, the other, both, or neither view), we suspect that the correlation between subscales might vary by context. In Study 2, people responded to many questions about change before the scale, possibly intensifying people's tendency to lean toward one definition of change or the other. Regardless, we are agnostic about the orthogonality of the scale; the central question of interest is whether and how each component predicts people's response to other change-related outcomes.

Thus far, we have given evidence that people hold subjective definitions of change that influence their spontaneous reactions to change-related language. Further, we found that incremental theorists held more "change is good" beliefs and entity theorists more "change is bad" beliefs. Although our research has demonstrated a connection between lay theories and subjective definitions, we have not yet investigated whether NoC beliefs are able to add understanding to the existing literature on lay theories.

One way to begin testing whether NoC has predictive relevance is to identify patterns of judgment that tend to be related to implicit theories, attempt to replicate these patterns using the standard implicit theories scale, then examine whether adding NoC good and NoC bad as

predictors explains variance over and above implicit theories. Past literature has demonstrated that lay theory beliefs predict attributions of effort and skill. Entity theorists, who believe that change is not possible, tend to believe that natural ability determines success and do not endorse the belief that effort is responsible for success. Incremental theorists, on the other hand, believe that well-placed effort can change one's current level of intelligence or competence at a task (Yeager & Dweck, 2012). However, findings of Studies 1 and 2 suggest that participants may be interpreting "change" in different ways in the implicit theories scale. If people have interpreted change differently in their responses to implicit theories, then we may be testing a correlation between 'effort' and 'improvement is possible' for some people, and for others it's a correlation between 'effort' and 'random change is possible.' It may well be that different assumptions about change would be linked to belief in the value of effort (effort should be more valued when people believe *improvement* is possible), versus the belief that success is contingent mainly on natural ability. Studies 3 and 4 investigate the relationship between effort beliefs and subjective definitions of change.

Study 3

Having asserted that the NoC scale is capturing dominant definitions of change, it is necessary to further extend one of the research questions: how do definitions of change converge with implicit lay theories of change to predict attitudinal outcomes? Past research has demonstrated that implicit lay theories of change predict the belief that effort and natural ability lead to success (Hong, Chiu, Dweck, Lin, & Wan, 1999). Entity theorists, believing that people generally do not change, endorse the idea that natural ability is primarily responsible for success and failure, looking to performance opportunities to demonstrate their skills. Entity theorists are more likely to compare themselves to others to determine norms for success (Yeager & Dweck,

2012; Burnette, 2010). Incremental theorists, on the other hand, are more likely to endorse the belief that hard work and effort are necessary predictors of success, valuing gained skills and learning new things over demonstrations of previously secured talents. Incremental theorists are more likely to make self-focused, rather than other-focused, personal goals.

Dweck and her colleagues have found that adopting an incremental mindset is beneficial for academic success (Yeager & Dweck, 2012; Dweck, 2007). Teaching students that hard work can have a real effect motivates students to engage in better study methods and fosters a belief in the likelihood of improvement versus a fixed state of intelligence. However, believing in effort may feel psychologically threatening to some participants. What if they put in a similar amount of effort as their classmates but their test scores do not change? Or get worse? If someone is interpreting the relationship between effort and change as unpredictable or uncertain, they may not be motivated to put in the hard work and instead fall back on the entity belief that natural ability predicts success. Thus, the belief that change could potentially be for the worse may prevent someone from jumping on the risky bandwagon of effort-believers.

The past two studies have demonstrated that entity theorists are more likely to endorse the view that change is unpredictable and uncontrollable. If an entity theorist believes that change is uncertain or potentially negative, then exerting effort does not necessarily lead to improvement, and may instead lead to decline or no change at all. If entity theorists are primarily defining change as random or chaotic, then their subjective definitions of change may explain why they do not endorse effort as a reason for success.

In Study 3, we test whether definitions of change are related to incremental and entity beliefs about the nature of success. Specifically, we ask participants the extent to which they believe success is due to natural ability (entity beliefs) or hard work (incremental beliefs), as well

as whether they look to performance (entity beliefs) or personal goal achievement (incremental beliefs) as indicators of success. We hypothesize that our beliefs about the nature of change will map onto beliefs surrounding effort, such that negative NoC beliefs will be associated with an endorsement of natural ability over effort, whereas positive NoC beliefs will more strongly endorse effort-related items. Further, we hypothesize that NoC beliefs will predict beliefs surrounding effort above and beyond implicit lay theories of change.

Method

Participants. Two hundred and seven participants were collected through the Mechanical Turk platform. Participants were eliminated from analysis if they failed more than one of the attention checks, eliminating six participants, leaving a total N of 201 (53% female, M_{age}= 37.50 (SD=12.71), range 19-73).

Design and Procedure. Participants filled out a demographic questionnaire followed by Rosenberg's 10-item self-esteem scale (Rosenberg, 1965), the 15-item NCC (Webster & Kruglanski, 1984), the eleven-item regulatory focus questionnaire (Higgins et al, 2001), and a single-item measure of life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985; Lucas & Donnellan, 2012). Regulatory focus was investigated further in Study 3 to evaluate the relationship between promotion/prevention orientation and NoC beliefs. We also felt that regulatory focus may be related to beliefs about success.

Following the premeasure, participants were first asked how successful they felt generally, in their relationships, and in their career. Perceived success was measured to account for whether beliefs surrounding success depend on current success levels. Perceived success did not affect the pattern of results and its correlation with key variables can be found in Table 9. Participants were asked a series of questions on success in four domains: general success,

relationships, school, and careers. There were seven success questions (3 general success, 1 relationships, 2 school, and 1 career) with up to four reasons for success that corresponded with the lay theories effort beliefs ('...when I have mastered a skill or lesson'), natural ability or performance beliefs ('... when I have received recognition for my abilities'), personal goals and skills (incremental self-focused: 'when I met a personal best'), as well as other-focused comparisons ('we seem happier than other couples') (see Appendix E). On a 7-point Likert scale (strongly disagree to strongly agree, with a neutral midpoint), participants reported the extent to which they believed each reason for success (effort, ability, skill, performance, etc.) was responsible for their success. Collapsing across the four domains, two aggregates were created for analysis: belief in effort and belief in natural ability (13 items for each). Effort/mastery beliefs related to the virtue of hard work, mastery, skill, and personal goal-setting, whereas the natural ability/performance beliefs were composed of performance, other-focused comparisons, and natural ability (similar to past research: Rattan, Good, & Dweck, 2012). The pattern of results did not change across the four domains (general beliefs, relationships, career, and school), therefore the composite was used. Both aggregates had high alphas, indicating that they hold together as cohesive theories of success (Cronbach's α for the incremental measure=.89; Cronbach's α for the entity measure=.84).

Following, we had participants complete the NoC scale, the implicit theories of personality scale (Chiu, Hong, & Dweck, 1997), and the Optimism-Revised Life Orientation Test (LOT-R) (Scheier, Carver, & Bridges, 1994). Optimism was investigated in Study 3 to continue the validation of the NoC scale. The LOT-R measures optimism toward the future and future change ("in uncertain times, I usually expect the best," e.g.), and may be related to general beliefs about change.

Results

In the analysis, higher scores on the NoC scales indicate greater endorsement of positive or negative change, respectively. A high implicit theories score indicates stronger entity beliefs (change does not occur). Positive NoC beliefs (M= 3.91, SD=.61) were related to neither negative NoC beliefs (M=3.20, SD=.74) (r(201)=-.04, ns) nor implicit theories (M=3.08, SD=1.17) (r(201)=-.10, ns). A higher endorsement of negative NoC beliefs was related to higher entity implicit theory beliefs (r(201)=.21, p=.003).

Nature of change and implicit theories on effort beliefs. To test the hypothesis that NoC beliefs predict lay theories of success beyond implicit theories, we ran a hierarchical regression analysis (for a summary, see Table 13). We conducted an analysis of implicit theories and nature of change beliefs predicting people's beliefs that success is determined by effort. First, we entered implicit theories into the first step of the model to replicate the finding from past research that implicit theories predict effort beliefs (Yeager & Dweck, 2012). As expected, people with higher entity theories reported less belief in effort/mastery, β= -.19, t(199)=-2.75, p=.007. We entered both positive and negative NoC beliefs into the second model, to test whether they uniquely predict the variance effort/mastery beliefs outside of entity theory beliefs. In the second model, entity theory beliefs were non-significant, β= -.13, t(197)=-1.88, p=.061. In this second step of the model, both NoC beliefs predict endorsement of effort/mastery theories of success. Participants who believe change is positive highly endorsed effort/mastery beliefs, β=.32, t(197)=4.96, p<.001, whereas participants who believe change is generally negative reported lower endorsement of effort/mastery beliefs, β= -.17, t(197)=-2.51, p=.013. These findings are in line with our hypotheses, indicating that NoC beliefs predict beliefs about effort/mastery above and beyond implicit theories. People who believe change is usually good

endorse effort/mastery, those who view change as bad eschew effort/mastery as a route to success.

Nature of change and implicit theories on natural ability beliefs. Further, we ran the same set of regressions to test whether implicit theories and NoC beliefs predict natural ability/performance beliefs (for a summary, see Table 8). In the first step of the model, we found that entity theories did not predict natural ability/performance beliefs, β=.08, t(199)=1.11, *ns*. This may correspond to past findings suggesting that, regardless of implicit theory, people endorse ability/performance as one factor predicting success, and that effort/mastery beliefs vary more widely across implicit theories (Dweck & Master, 2008; Yeager & Dweck, 2012). We entered NoC beliefs into the next step of the model and found that natural ability beliefs are related to both believing that change is positive, β=.38, t(197)=5.97, p<.001, and that change is negative, β=.31 t(197)=4.79, p<.001. Similar to past literature (Yeager & Dweck, 2012), unanimous agreement over natural ability/performance beliefs is found again in our results, as we see that both NoC beliefs are related to agreement with natural ability/performance beliefs.

Nature of change and secondary measures. As hypothesized, those with stronger beliefs in optimism reported higher beliefs in the positive nature of change, r(201)=.40, p<.001. Further, high endorsement of optimism was related to low endorsement of negative NoC beliefs, r(201)=-.41, p<.001. Strong negative NoC beliefs were related to lower endorsement of both promotion orientation, r(201)=-.33, p<.001, and prevention orientation, r(201)=-.17, p=.019. High beliefs in positive NoC were related to a greater endorsement of promotion orientation, r(201)=21, p=.004. The relationship between NoC beliefs and regulatory focus is beyond the scope of this thesis and will not be discussed further. The results are summarized in Table 9.

Discussion

Study 3 demonstrates that NoC beliefs offer insight into the connection between lay theory beliefs and effort beliefs. For both effort/mastery and natural ability/performance theories of success, NoC beliefs are unique predictors, above and beyond incremental theories. This suggests that believing success is due to effort may be more closely tied to a belief that change is good, controllable, and predictable than the belief that change is possible. Believing change is bad, unpredictable, and uncontrollable may underlie a devaluing of the influence of effort in determining success. When interpreting the findings in her research on education, Dweck interprets the entity theories of success to mean that students do not believe that they can improve. However, the current research demonstrates that spontaneous definitions of change are related to success beliefs. Therefore, the assumption that entity theorists believe that *improvement* is not possible may be a misinterpretation; when entity theorists are responding to the implicit theories items, they may be using a different definition of change, potentially decline or chaos, and thus responding that chaotic change is unlikely.

Study 4

Studies 1 and 2 demonstrate that people hold dominant definitions of change. This could have implications for scales such as the implicit lay theories (IT) of change scale (Dweck, Hong, & Chiu, 1993) that ask about change without defining it. Indeed, in both of those studies, we also demonstrated that entity theorists had considerably more negative definitions of change than incremental theorists. The assumption in much of Dweck's work is that people's conceptions of change map onto beliefs about improvement- assuming that the scale is asking: is intentional self-improvement possible, or not? Given the results from Studies 1 and 2, we can speculate that

participants may not all be interpreting "change is possible" as "improvement is possible", and may be perceiving the change as something more negative or unpredictable.

Study 3 made a first attempt at examining both implicit theories (IT) and NoC in a domain commonly associated with implicit theories: people's theories about the sources of success. Incremental theorists believe that effort determines levels of success, whereas entity theorists attribute success to natural ability (Yeager & Dweck, 2012). However, we found that NoC predicted success beliefs over and above IT and actually reduced the predictive effect of IT to marginal significance when entered into a model predicting the belief in effort. Therefore, entity theorists' definition of change as negative, unpredictable, and uncontrollable could help explain their lack of endorsement of effort beliefs, since they may believe that effort may be less likely to result in predictable improvement (hence they would have exerted effort for naught).

Thus far, our research has not demonstrated the direct impact of subjective definitions when answering the lay theories scale. One way we might assess the overlap in definitions is to re-word the implicit theories scale, replacing 'change' with higher precision words. For instance, do people respond differently to "people can *improve*" versus "people can *change"*? In Study 4, we circle back to the question of convergence between subjective definitions of change and lay theories and create versions of the implicit theories questionnaire that specify the nature of the change in question. In other words, we ask participants to indicate whether they believe people's attributes typically a) change, b) improve, c) decline, or d) change randomly. Keeping in mind that incremental theorists are more apt to define change as positive, predictable, controllable and entity theorists define change as undesirable, unpredictable and uncontrollable, we envision the "improve" condition as mapping most closely to what an incremental theorist's spontaneous interpretation of the question might be, and the "random" condition as reflecting what an entity

theorist's interpretation might be. We hypothesize that all participants are more likely to agree that 'improvement' versus 'random change' is possible, regardless of their implicit theory. The possibility of positive change is less psychologically threatening and we argue that participants will be more likely to endorse improvement. The possibility of random change, however, is psychologically threatening and may lead participants to deny the possibility of this uncertainty to a greater extent than the possibility of positive change.

Although the current research is not designed to test motivation, we speculate that spontaneous definitions of change might in part account for why incremental theorists say more change is possible and entity theorists say less change is possible. For example, if entity theorists are systematically defining change as more random and threatening, they may be disinclined to believe that this random change is looming and about to occur at any moment. Hence, they may show a tendency to say change is not very possible. This speculative possibility would suggest that, rather than denying improvement is likely, entity theorists' tendency to deny the possibility of change could at least in part be a tendency to deny that random change is possible, in order to distance themselves from the psychological threat. Incremental theorists who spontaneously interpret change as improvement would in contrast be happy to endorse the high possibility of change. Perhaps, then, when change is explicitly defined as "improvement," both incremental and entity theorists may feel more comfortable agreeing that the positive change is possible (looking more like a typical incremental theorist in the undefined scale), whereas when change is defined as "random," perhaps both incremental and entity theorists would endorse change as less possible (looking more like a typical entity theorist in the undefined scale). Further, we predict that participants who hold strong negative NoC beliefs will be more likely to agree that random change is possible, as random change is in line with their subjective definitions of change.

Further, we extended Study 3 by having a final section asking about effort, allowing us to test how implicit theories of *improvement*, rather than change, are related to effort beliefs. If someone believes that change means improvement, they are likely to put in the effort to ensure that positive change. However, if one endorses the belief that random change is a possible outcome, then exerting effort may seem futile as one cannot be certain of a positive outcome. We predict that the belief in the possibility of improvement will predict the belief in effort, whereas the belief that random change is possible will not predict effort beliefs.

Method

Participants. Five hundred and twenty seven participants were collected through the Mechanical Turk platform. Thirteen participants were eliminated from analysis due to failing more than one of the attention checks, leaving a total N of 514, randomly assigned to one of the four conditions (53.9% female, M_{age}=36.08 (*SD*=11.32), range 19-73).

Design and Procedure. Participants filled out a demographic questionnaire followed by a personality premeasure containing two original items from Dweck's implicit theory of personality scale ("everyone is a certain kind of person, and there is not much that can be done to really change that"; "all people can change even their most basic qualities") (Chiu, Hong, & Dweck, 1997). The two items gave us a baseline implicit theories measure for each participant. The Rosenberg self-esteem (Rosenberg, 1965) and a one-item life satisfaction item (Diener, Emmons, Larsen, & Griffin, 1985; Lucas & Donnellan, 2012) were included in the premeasure as filler items.

Participants were then randomly assigned to one of four conditions. All four conditions used the remaining six items from the implicit theories of personality scale. Three of the conditions included wording that defined change in a particular way (improvement, random

change, or decline); the fourth condition was the typical implicit theories scale using unspecified "change" language. All four conditions used the remaining six items from the implicit theories of personality scale. In the three experimental conditions, the implicit theories items were altered to reflect capacity for either improvement, random change, or decline ("the kind of person someone is, is something very basic about them and can't [be improved/randomly change/decline] very much," etc.). In the control condition, participants answered the original six items, allowing us to have a comparison for our experimental conditions.

After completing the 'change-defined' implicit theories items, participants in all conditions responded to three normally worded implicit theories items (with change undefined), the two from the premeasure and one additional item. The post-measure of implicit theories was included to test whether people might carry over their interpretation of change from the specific 'change frame' items they were assigned to read. We did not have hypotheses about whether these items would be affected.

Participants then completed additional questions on the importance of effort and natural ability as determinants of success (e.g., "If people do poorly at something, it is usually because they do not have the natural ability", "through increased effort, people can significantly improve on something"). The questionnaire was designed by the experimenters to extend the findings of Study 3 (where people reported attributions of success on a longer questionnaire) and to test a) whether attributions would change by condition (we had little reason to predict this would occur), and b) effort beliefs would correlate differently with different version of the implicit theories scale (improvement, decline, random, and control). To evaluate this, we created a composite score of success beliefs where high scores indicate a belief in effort and low scores indicate a stronger endorsement of natural ability as the source of success (Cronbach's α=.75).

After, participants completed the NoC scale as well as the 15 item NCC scale (Webster & Kruglanski, 1984). The NCC was included to test hypotheses outside the scope of this thesis and will not be discussed further.

Results

Unlike the previous studies, high scores on the control and experimental means will indicate a belief that *change is possible* (incremental direction). It is intuitively easier to interpret results coded in this direction given that change is defined directionally (e.g., that decline is possible, improvement is possible, or random change is possible).

Effect of different definitions on endorsement of the possibility of change. First, we ran an ANOVA to test whether the condition had an overall effect on how participants responded to the experimental and control versions of the scale. The ANOVA was significant, indicating that participants did not respond the same to all presentations of 'change', $F(3, 514)=4.22$, $p=.006$. Post-hoc tests using Tukey's HSD demonstrated participants were less likely to endorse 'random change' ($M=3.67$, $SD=1.13$) than improvement ($M=4.13$, $SD=1.01$), or decline ($M=4.02$, $SD=.92$), however there was no significant difference between endorsing random change and the normally-worded IT items ($M=3.96$, $SD=1.09$). There were no other significant differences.[3] This suggests that overall, people respond differently to the implicit theories scale depending on how change is defined. Given previous evidence that various people do define change very differently, this finding suggests that the implicit theories scale could yield different results depending on its interpretation. Since the control condition does not differ from any other, strong conclusions about whether one definition is most common cannot be made. However,

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[3] The analysis was run separately with the pre measure of implicit theories as a covariate. The condition factor in the ANCOVA was still significant, $F(3, 513)=10.92$, $p<.001$.

directional change is endorsed as more possible than random change. This may suggest that

people are especially averse to acknowledging the possibility of unpredictable change.

        Nature of change, implicit theories, and defined implicit theories score. To test how

the defined implicit theories scores - as defined in each condition - relate to the implicit theories

premeasure (*M*=3.90, *SD*=1.17), positive NoC beliefs (*M*=3.78, *SD*=.60), and negative NoC

beliefs (*M*=2.75, *SD*=.70), we ran a series of zero order correlations (refer to Table 10). Higher

endorsement of positive NoC beliefs was related to lowered endorsement of negative NoC

beliefs (*r*(509)=-.32, *p*<.001). The negative correlation here is in line with our main argument

that, although people can hold both positive and negative change beliefs as demonstrated in the

orthogonal correlation in past studies, people generally hold a dominant view about change.

Participants who scored high on incremental theory beliefs in the premeasure endorsed strong

positive NoC beliefs, (*r*(509)=.30, *p*<.001), and low negative NoC beliefs *r*(516)=-.48, *p*<.001).

        Next, we sought to examine the relations between the defined implicit theories scales we

created (improvement, decline, random change, control) and other variables of interest. All

correlations can be found in Table 11 and will not be repeated here. First, we examined the link

between the general implicit theories scale (change undefined) and the more clearly-defined

implicit theories scales. We examined correlations both with the implicit theories premeasure

and the post-measure. Not surprisingly, all correlations were quite high (between .72 and .92).

        Next, we examined whether the defined implicit theories were related to NoC scores.

People who endorse a strong positive NoC report agreeing more that people can change – in all

directions except decline (which was in the same direction but non-significant). Further, those

who believe the NoC is mostly negative report that people have less capacity to change across

the board – for good, bad, or random change. The consistent relationship between NoC beliefs

and beliefs surrounding the likelihood of change may suggest that positive NoC is broadly consistent with believing any kind of change is possible (and possibly desiring change), whereas higher negative NoC is linked to expecting (and perhaps preferring) that change is less possible, regardless of the type of change.

   Lay theories of success. Recall in Study 3 we investigated the extent to which subjective definitions of change were related to attitudes commonly associated with implicit theories. Specifically, Study 3 looked at the relationship between NoC beliefs and beliefs surrounding mastery, effort, performance, and natural ability. In Study 4, we defined "change" explicitly as improvement, decline, or random change in versions of the implicit theories scale. We were interested in whether beliefs about the degree to which improvement, decline, and random change are possible predict effort beliefs differently. For instance, if someone agrees with "people can improve," do they also endorse effort beliefs? Further, does the belief that "people can randomly change" relate to effort beliefs in the same way as the belief that "people can improve"? If someone believes that improvement is possible, it is likely that they will see the value in effort. However, if someone believes that random change is a possible outcome, effort may or may not be worth it since the outcome is uncertain.

   The correlations are reported in Table 11 and will not be repeated here. Higher endorsement of effort was related to higher belief in the possibility of change across all directions (good, bad, random, and control). The correlation between effort beliefs and improvement was significantly higher than with random change ($z=2.48$, $p=.013$)[4], which, again, may demonstrate that people who endorse effort beliefs are thinking of improvement when answering items about change.

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[4] Calculated using http://vassarstats.net/rdiff.html

Further, we sought to examine whether the precisely worded change scales predicted effort beliefs over and above the typical implicit theories scale, where change is framed generally. We conduct a series of multiple regressions that allow us to test this question as well as replicating analyses from Study 3, that NoC beliefs predict theories of success over and above implicit theories. Second, and unique to Study 4, we can evaluate whether belief in the possibility of specific definitions of change predicts effort beliefs, above and beyond general undefined implicit theories. For example, one could imagine that belief in effort is more closely linked to believing that improvement is possible than the belief in the possibility of general or random change.

To investigate this question, we ran four separate hierarchical regression analyses, evaluating each of the four conditions separately. Participants in all four conditions responded to the same pre-measure of implicit theories (2 items) before answering one of the four precisely-defined possibility of change scales ("people can improve," "people can get worse," "people can randomly change," and the control condition, "people can change"). The hierarchical regressions were set up to evaluate the predictive effect of incremental beliefs (high score indicating incremental beliefs), belief in the possibility of specifically defined change (improvement, decline, random, or control) and NoC beliefs on beliefs about effort. For each of the four regressions, we entered incremental theory into the first step of the model. We added the precise definition of change scale into step 2, and nature of change beliefs into a third and final step. For all four conditions, the brief premeasure of incremental beliefs predicted a greater belief in effort in Step 1, replicating past research (Yeager & Dweck, 2012). Next, we examine the predictive value of precisely defined theories of change, and NoC scores. Because there were no differences in direction or significance in how the premeasure and the condition measure predicted effort

beliefs, between Step 2 and Step 3, therefore only Step 3 is reported here in full. The full

regression is summarized in Table 13.

Recall that in the control condition, both the premeasure and the experimental block

contained items from the original implicit theories of personality scale, where change is framed

generally. In the control condition, greater incremental beliefs on the premeasure predicted

greater endorsement of effort beliefs, $\beta =.23$, $t(148)=2.16$, $p=.033$, whereas the experimental

block did not additionally significantly predict effort beliefs, $\beta =.09$, $t(148)=.84$, *ns*. Given that

items in both the premeasure and the experimental block were taken from the same scale, it is

unsurprising that the second measure does not add additional predictive effects.[5]

However, what happens when participants are asked to respond to the likelihood of

"improvement" rather than general "change"? It is easy to imagine that believing that

improvement is possible lends itself to believing that effort is a meaningful contributor to

success. As expected, greater belief in the possibility of improvement predicted greater

endorsement of effort beliefs, $\beta =.33$, $t(119)=2.34$, $p=.021$, and reduced the predictive power of

the premeasure of the implicit theory scale to marginal significance. This finding indicates that

Dweck's interpretation of change for incremental theorists may be correct: those high on

incremental theories may be interpreting 'change' as 'improvement' and are endorsing the idea

that effort can lead to greater outcomes. Demonstrating a similar pattern, greater belief in the

possibility of decline also predicted greater belief in the value of effort, $\beta =.37$, $t(111)=3.39$,

$p<.001$. Although this finding is on its surface less intuitive, the relationship between decline and

effort beliefs may be due to a prevention mindset, where participants are putting in effort in order

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[5] This result could be surprising in one way: the measure of implicit theories in Step 2 of the analysis explained no additional variance even though it was a longer version of the premeasure included at Step 1. One thing this may indicate is that the brief premeasure does a good job of predicting the construct, despite its brevity.

to prevent the potential of decline. The general measure of incremental theory did not significantly predict effort beliefs in either the improvement (β =.19, $t(119)$=1.39, *ns)* or the decline conditions (β =.05, $t(111)$=.41, *ns*) once the defined-change scales were added into the model, indicating that effort beliefs may be related to belief in a specific kind of directional change to a greater extent than the belief in general change.

In the condition in which change was defined as random, the precise definition of change scale did not predict effort beliefs, β = -.05, $t(119)$=-.39, *ns*. However, stronger incremental theory beliefs (premeasure) were related to greater endorsement of effort beliefs, β =.30, $t(119)$=2.36, *p*=.020. Unlike the improvement and decline conditions, defining change as "random" does not specify the direction of change but instead indicates that change was more unpredictable. It may be that people who endorse random change have little reason to endorse effort as a route to success, since they may view change as unpredictable and uncontrollable. If one believes in random change, there is no concrete end for which to put the effort towards.

Finally, we examined NoC beliefs across all four conditions. Recall in Study 3, negative NoC was related to a lower belief in effort, while belief that change was positive predicted greater endorsement of effort. In the current study, negative NoC beliefs predicted low endorsement of effort beliefs across all four conditions (see Table 13). Participants who believe change is bad, unpredictable, and uncontrollable may not see the point in effort, as change is largely unwelcome and uncontrollable. Positive NoC beliefs significantly predict effort beliefs in only the random change, β =.18, $t(119)$=2.16, *p*=.033,* and control condition, β =.24, $t(119)$=3.39, *p*=.001, but not in the conditions where change was directionally defined (improvement, β =-.03, $t(119)$=.41, *ns;* or decline, β =.06, $t(111)$=.73, *ns*). We speculate that participants are using their dominant belief about change (as reflected in their NoC scores) to inform the direction of change

when the direction is not defined (e.g. "people can change", "people can randomly change"). For

the participants who believe that change is good, effort may be endorsed because the participant

believes it could lead to upward growth. In contrast, for the participants who believe that change

is bad or unpredictable, effort may not be endorsed because the outcome is unknown. It may be

that NoC good no longer predicted effort in the two directional conditions, because belief in the

directionality of change was already captured in that other scale.

Discussion

Study 4 was designed to investigate whether precise definitions affect responses to the

implicit theories of change scale. Overall, participants were less likely to agree with the

possibility of random change than with the possibility of improvement or decline, indicating that

the nature of change affects how possible the change seems. Taken together with findings from

earlier studies in which people who *believed* change was random also endorsed less possibility of

change (negative NoC predicted higher entity beliefs), the fact that participants rated random

change as less possible than directional change might suggest that people prefer not to leave

open the possibility of large amounts of random change. By demonstrating lower endorsement of

the possibility of random change, we speculate that participants may be distancing themselves

from the threat of uncertainty.

The fact that people also acknowledge the high possibility of decline is intriguing. On

one hand, one might think that this is akin to endorsement of 'change is bad". However

correlational evidence suggests that high negative NoC is linked to lower endorsement of the

possibility of decline, suggesting that beliefs about the nature of change do not necessarily

predict the expectation of more change, even when change is in a direction consistent with

dominant beliefs. Instead it appears that negative NoC might prefer less possibility of change of

any type. We speculate that dominant definitions of change may guide an openness to the possibility of change. When the nature of change is left to subjective interpretation, as in the implicit theories scale, participants may be inclined to use their spontaneous definitions of change to guide their response. If one believes that change is inherently negative or unpredictable, it may be psychologically safer to endorse the belief that the negative change is also not possible.

Interestingly, the belief that change is negative and unpredictable is related to low agreement that random change and decline can happen, and the belief that change is positive is related to high agreement that any type of change (general, improvement, decline, or random) can occur. We speculate that spontaneous definitions of change may guide an openness to the possibility of change. When the nature of change is left to subjective interpretation, as in the implicit theories scale, participants may be inclined to use their spontaneous definitions of change to guide their response. If one believes that change is inherently negative or unpredictable, it may be psychologically safer to endorse the belief that the negative change is also not possible.

General Discussion

Through the current set of studies, we have developed a scale to capture dominant definitions of change and demonstrated how NoC beliefs are related to attitudes surrounding change-behaviour. Studies 1 and 2 demonstrate that participants hold spontaneous definitions of change that are related to what words and concepts they automatically associate with change. By having participants rate their spontaneously generated change-related words, we found that NoC beliefs predict how positive or negative participants view their associations with change, such

that negative NoC beliefs predict negative associations and positive NoC beliefs predict positive ones.

Further, Study 3 demonstrated that spontaneous definitions of change are related to beliefs about what contributes to success, specifically whether hard work and goal-focused effort can affect success. We found that people who endorse a positive belief about change are likely to highly value effort and goal-setting, whereas participants who believed change is generally negative showed low endorsement of effort beliefs. Participants who believe that change is good may be intuiting that effort and hard work will lead to desirable change – specifically success – across several domains. Conversely, participants who believe change is bad may believe that effort can lead to random or unpredictable consequences and hence may be unrelated to ultimate success. If hard work will lead to an unknown end, then what is the point of putting in this potentially futile effort? Study 3 also demonstrated that NoC beliefs predict effort beliefs above and beyond implicit lay theories. Past research has demonstrated that people who believe change is possible (incremental theorists) are likely to endorse effort beliefs, but we found that the addition of NoC beliefs into the regression model reduced the predictive value of lay theories, offering new insight into the relationship between change beliefs and attributions for success.

The findings in Study 3 demonstrated a relationship between implicit lay theories and NoC beliefs. To further understand how definitions of change are related to beliefs about the possibility of change in personality, in Study 4 we altered the implicit theories scale to measure beliefs about whether improvement, decline, or random change is possible. We found that participants were less likely to agree that random change is possible than both improvement and decline. Further, we found that only beliefs about the likelihood of improvement and decline were directly related to effort beliefs, whereas the belief in random change did not significantly

predict beliefs about effort. The lack of relationship between belief in random change and effort beliefs demonstrates that effort beliefs may be more closely tied to the belief in the likelihood of a specific directional outcome, for instance improvement or even decline, more than it is related to the belief in unpredictable change.

Across all four studies, we found that positive and negative NoC beliefs fluctuated from a moderate negative correlation to orthogonality. We argue that people have knowledge of the possibility of both good and bad change (Poon and Koehler, 2006). When reading the scale, participants could agree that change can be both good or bad, strongly endorse one over the other, or fail to strongly endorse either opinion. Past literature has demonstrated that seemingly competing beliefs can be endorsed in tandem, such as prevention and promotion orientation in the regulatory focus literature (Higgins et al, 2001) and destiny versus growth mindsets in the implicit theories of relationships literature (Knee, 1998). Knee (1998) demonstrated that people can endorse both the belief that the success of a relationship is determined by romantic destiny (that if it is meant to be, it is meant to be) and that a successful relationship is achieved through the cumulation of mutual growth and hard work (relationships are mainly successful because people work at them). Similarly to how holding simultaneous beliefs in destiny and growth may seem contradictory, some participants in our studies may endorse both (or neither) negative and positive change beliefs. Due to the context of our studies or the size of our sample, some of the studies may pull for a more polarized definition of change, leading to a negative correlation between the positive and negative NoC beliefs. Future research should investigate times when these beliefs are more polarized, such as during times of intense personal change or in a time of stress when people may be more likely to employ personal heuristics about the nature of change.

Implicit lay theories and nature of change beliefs. Dweck's lay theories of change scales originate from her work on learned helplessness (Dweck, 2012). In her work on learned helplessness, Dweck identified that beliefs about personal control influence beliefs about the possibility of change (Dweck, 2012). In a study on learned helplessness, Dweck found that students who feel they are not in control showed the greatest decline in performance. Feeling "not in control" was operationalized by either taking less personal responsibility for performance (belief in the influence of external factors) or by the belief that success can be attributed to natural ability. For both of these operationalizations, the participant feels that they are not in control, concluding that effort is futile since change is not possible, and are likely to score as an entity theorist on the implicit theories scale (Dweck, & Reppucci, 1973; Yeager & Dweck, 2012). If someone feels like they have control over the situation, they are more likely to believe that change is possible, scoring as an incremental theorist. In sum, the belief that change is possible is theoretically rooted in the belief about whether one has the capacity to control change.

An important part of the NoC scales is the belief in controllability. In our studies, the belief that change is uncontrollable is tied into having a negative view of change, whereas the belief that change is controllable is linked to the belief that change is generally positive. Given the origins of Dweck's lay theories scale, it may seem as though there is significant overlap between the intentions of the NoC scales and the implicit lay theories of personality scale. The implicit theories items, such as "everyone, no matter who they are, can significantly change their basic characteristics", may indicate a certain level of controllability (e.g., people can change if they choose to). However, our NoC scales expand upon the implied controllability to capture beliefs about valence and predictability, as well as asking directly about beliefs surrounding control. Further, we measure people's assumptions about what change usually is – not whether or

not people can change. Although our scale shares considerable conceptual overlap with Dweck's, it does target a different, though related, phenomenon.

We conceptualized the NoC scales with three related factors (valence, predictability, controllability) in order to capture a range of beliefs about the nature of change. However, these factors have not been designed to work as distinct subscales. We argue that, generally, the three factors combine to create a dominant profile of change which captures a general view about change rather than a specific perception of change within one instance or in terms of one dimension. We argue that general views of change are a high level conceptualization that contains, but is not necessarily limited to, views on how positive, predictable, and controllable change is.

However, there may be situations where one of the three factors may be motivating attitudes or behaviour. For example, a key part of resiliency is the ability to adapt and transform to certain situations (Frederickson, 2001). People who are resilient may feel a need to adapt or change and may, in fact, welcome that opportunity even though they may not believe that change is necessarily predictable or controllable but believe that, overall, change is for the better and strengthens character. Resilient individuals, therefore, may be motivated to approach change even though they may not feel as though it is necessarily controllable or predictable. In this case, it may be more useful to focus research on the "change is good" factor within the positive NoC scale. Future research might benefit from developing reliable subscales that could be more readily disentangled in response to specific research questions that might predict a divergence between subscales.

The importance of multiple meanings of change. There are two key takeaways from the present research. First, we have demonstrated that there are individual differences in the

dominant view that people hold about change, and different definitions of change have distinct

attitudinal outcomes. Much research has demonstrated that people, as social beings, categorize

people into stereotypes to make sense of a chaotic world (Ramsey, Langlois, Hoss, Rubenstein,

& Griffin, 2004; Schaller & Maas, 1989). The same may be true of beliefs surrounding

"change:" people hold dominant views about change that may be informed by past life

experiences and help to categorize the world around them. Especially when provided with little

context or clarification about the nature of change, people may rely on their subjective and

spontaneous definitions to guide their perceptions of whatever the "change" might entail.

Associating change with either a positive or negative connotation may allow people to better

understand the situation and this categorization of change may have subsequent consequences for

behaviour. For someone who believes that change is negative, confronting change may mean

bearing down and engaging in defensive cognitions and behaviours, whereas someone who

welcomes change or believes it to be positive may rush towards the opportunity. The current

research does not yet unpack behavioural outcomes related to beliefs about the nature of change,

but this should be investigated in future research.

Our work on divergent definitions of change are an example of how subjective life

experiences or individual perceptions feed into language and communication. Although people

may be good at overtly acknowledging that others have different opinions or life experiences, the

differences in fundamental reactions or definitions may lead to misunderstandings. Due to

egocentric biases, people may tend to assume that other people share their own attitudes (Woltin,

Yzerbyt, & Corneille, 2011). This is known as an "empathy gap." People struggle with

understanding that people hold attitudinal differences that fundamentally differ from their own

(VanBoven & Lowestein, 2005; Ditto & Koleva, 2011). Jim, who believes that change is good,

and has an immediate positive affective reaction to the idea, may struggle to understand why Jane is not excited by the "change is coming" sign, which, to him, clearly indicates excitement and the opportunity for growth. His positive affective response may blind him to the possibility that, for Jane, the same word "change" created instead the affective experience of anxiety and dread. Someone with a dominant positive view of change may use "change" as a substitute for "improvement" in self, organization or society all the while assuming that the audience receiving the message will be equally enthusiastic about these seemingly obviously favorable developments. The empathy gap may limit their recognition that for some others, talk about change will evoke negative and distressing associations. Simple clarification of what one means when they talk about change may have important ramifications for how people understand and discuss change and change-related behaviours. In the earlier example, we used an example of Jim and Jane reacting differently to a "change is coming" sign posted at their workplace: Jim believing change is positive and Jane endorsing a more cautious view of change. Perhaps their boss holds a positive view of change, and is thus assuming that, by posting the "big change is coming" sign, they were giving their employees a hint of a nice surprise to look forward to. Jane used her subjective definition of change to infer that her boss meant the sign as a caution, which may have caused her to be distracted at work and, consequently, not work as well as she normally would have. This anecdotal example demonstrates the empathy gap in change beliefs, with Jane's boss endorsing one definition of change and Jane believing change means quite the opposite, may influence behaviour and possibly disrupt relationships, without either party fully realizing what had caused the miscommunication.

One could imagine that a lack of definitional clarity of key terms would have grave impacts across other domains as well. Politicians, for example, are apt to use change-related

rhetoric, especially around election period. Barack Obama's first presidential campaign was run off of a single-word slogan: "Change". Given the present research on definitions of change, one could imagine that, although this slogan may have attracted a large portion of the population, the "change" slogan could have also set off alarm bells for the portion of the population who hold strong beliefs that change is something negative or chaotic. Although the association with a liberal candidate may inform the nature of change further (allaying concerns for some negative NoC liberals and possibly heightening concerns for change-averse conservatives), the lack of context surrounding much of Obama's "change" messaging may have led to a general wariness among potential voters who lean toward a negative nature of change definition. These automatic associations with change could play a role in reducing sympathy for a candidate running on that platform. Future research should investigate the implications of change rhetoric in politics, as well as how people with divergent definitions of change discuss the consequences of change.

From a broader methodological standpoint, the current research presents a particular instance where the participant may not be interpreting scale items or experimental material in the way it was intended by the researchers. If participants read that "Sam has changed a lot in the past year," the researchers may falsely assume that all participants are intuiting that Sam has improved, but this may not be how all of our participants interpret the item. Some participants, who score highly on the negative NoC scale, may have inferred that Sam had a tough year, maybe losing their job or going through a personal existential crisis. If the researchers assume all participants are reading "improvement", their interpretation may be misguided. Our work on divergent definitions of change indicates that researchers may need to provide definitional clarity in their instructions to participants in order to ensure a correct interpretation of their results.

Generalizability constraints. We acknowledge that there are constraints to the generalizability of research given the demographics of the sample. The samples used for the studies in the present thesis were taken from the Mechanical Turk (Mturk) platform. Our participant pool (N=1108, across 4 studies) consisted of American citizens with a the mean age was 36.14 (*SD*=11.80, range 19-88) and who were 51.5% female, 98% native English speakers, median income of $40 000 to $49 000, 77% identified as white, and 45.8% Christian (19.4% non-religious, 10.9% atheist, 12.4% agnostic). These demographics are typical of an Mturk sample (Ipeirotis, 2010).

The demographics of the sample may hinder the generalizability of the results. For example, there is evidence that the rhetoric around 'change' shifts cross-culturally. Chinese students, for example, expect more change in their lives than Canadian students and the discrepancy between forecasted change increases with age, with Chinese students expecting more and more changes as they age (Ji, 2008). In China, as well as other East-Asian countries, the lifespan is thought of circularly whereas the West tend to conceptualize change as a linear trajectory (Ji, 2005). Given the circular conceptualization of life, Chinese people may expect change as a necessary and integral part of life and may be more likely to score as incremental theorists than Canadians (Ji, 2008). One could imagine that the cultural perspective of seeing change as necessary may alter perceptions about the Nature of Change. Perhaps for Chinese participants, the relationship between negative and positive NoC beliefs would be reliably orthogonal. If there is an increase in cultural comfort with change, perhaps this would lead to greater acceptance that change can be both good (and predictable and controllable) as well as bad (and unpredictable and uncontrollable). However, just as we have found that there is variability in subjective definitions of change within our Western sample, there may be important variability

in change beliefs within cross-cultural populations as well. Future research should expand the demographic range of our sample to explore cross-cultural questions, as well as questions involving lifespan development and socio-economic status.

Limitations and future directions. The current research investigates dominant and subjective definitions of change and has demonstrated that beliefs about change are related to specific associations with change, perceptions of change-related words and constructs, as well as change-related behaviours such as beliefs surrounding effort and hard work. The current research is exploratory in nature and thus opens up the research on change for further investigation.

For example, the current set of studies does not yet answer where change beliefs come from or the rigidity of beliefs about the nature of change. In Study 3, we have suggested that NoC beliefs may be a predictor of belief in effort as well as lay theories beliefs (specifically, the belief that change is possible), but without testing a causal chain, the relationship between NoC beliefs and effort beliefs is still speculation. Thus far, we have not attempted to manipulate change beliefs, which could provide insight into the origins of change beliefs as well as whether change beliefs are fluid in nature. Past research has been successful in manipulating lay theories of change, both in short term experimental research (Hong et al, 2004) and long term interventions in an education setting (Yeager & Dweck, 2012), and has also demonstrated that beliefs surrounding the possibility of change are fluid in nature, depending on the context and relevant provided information (Leith et al, 2014). We suggest that future research attempt to test the fluidity of change beliefs both through manipulations and varying the context in which change is presented.

Change is a dynamic and complex process. We suggest that positivity, predictability, and controllability (as well as the respective opposites) are important factors involved in people's

subjective definitions of change. However, our work lends itself to the idea that change is multi-faceted, and we encourage future exploration into the plethora of other dimensions that are unexplored in the present and past research. Future research could explore preference for change and the personality traits or timespan development associated with various attitudes towards change. For example, how do individual differences, like subjective definitions of change, fluctuate within times of change? For people who are averse to change or believe that its nature is negative, how do they react when confronted with a large amount of personal change or social upheaval?

Future directions could also explore the notion of the "empathy gap"- do people fail to recognize that their view of change is not shared, and does it alter communication? People find it difficult to intuit that people may hold attitudinal differences that are fundamentally different from their own (VanBoven & Lowenstein, 2005; Ditto & Koleva, 2011). The 'empathy gap' occurs especially during times of "hot cognition"- when people engage in motivated reasoning due to their emotional state. For example, if Jim feels passionate about instilling change in his work place, something he defines as positive, he may view Jane's lack of enthusiasm is due to laziness if she does not put forward equal effort to bring about change, when really change makes Jane uncomfortable since she defines change as unpredictable. Understanding another's perspective on change could ease communication and alter how messages are received. These insights might suggest that communicating differently about social change would be helpful- for instance, a politician might explicitly define what kind of "change" is involved in their platform-specifying the change as positive, gradual, predictable, and controllable. Alternatively, a policy could be framed in terms of its continuity with past successful policy and long-standing values

rather than in terms of its innovative newness, in an effort to comfort those who have a fearful reaction to change.

Given the omnipresence of change in everyday life, it is important to understand how it is conceptualized differently by each person. Understanding subjective reactions to change can help researchers to understand individual behaviour during personal change and intergroup behaviour during times of social upheaval. Our nature of change scales can be used in future change-related research to provide insight in future change-related research and help unpack the complex nature of change.

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Table 1

Correlations between NoC beliefs and individual differences- Study 1

Variables	1	2	3	4	5	6	7	8	9
1. Positive nature of change	1								
2. Negative nature of change	-.07	1							
3. Implicit theories	-.24***	.35***	1						
4. To what degree does your household income make you feel uncertain?	-.14*	.23***	.11†	1					
5. Are your economic needs being met by your current household income?	.26***	-.08	-.13*	-.59***	1				
6. RSES	.35***	-.28***	-.17**	-.39***	.38***	1			
7. Perceived control	.21**	-.34***	-.15*	-.30***	.24***	.58***	1		
8. NCC	.09	.33***	.18**	.09	-.05	.05	-.01	1	
9. Prevention mean	.03	-.26***	-.01	-.18**	.08	.21**	.21***	.05	1
10. Promotion mean	.31***	-.31***	-.24***	-.35***	.27***	.68***	.51***	.10	.18**

Note. $^{\dagger}p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$; Abbreviations listed can be interpreted as: Rosenberg self-esteem scale (RSES), Need for Cognitive Closure (NCC)

Table 2

Correlations between coder's rating of self-generated (SG) change word- Study 1

Variables	1.	2.	3.	4.	5	6	7.	8.
1. Positive NoC	1							
2. Negative NoC	-.07	1						
3. Implicit Theories	-.24**	.35**	1					
4. Q1: Negative SG words	-.21**	.29***	.22**	1				
5. Q1: Positive SG words	.28***	-.19*	-.19**	-.29**	1			
6. Q2: Negative SG words	-.10	.15*	.08	.33**	-.02	1		
7: Q2: Positive SG words	.11†	-.18**	-.02	-.08	.12†	.11†	1	
8. Q3: Negative SG response	-.20**	.17**	.15*	.26***	-.05	-.01	-.05	1
9. Q3: Positive SG response	.06	.05	-.05	.04	.06	.09	.10	.00

Note. †$p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 3

Correlations with key variables and subscales- Study 1

Variables	Positive NoC	Negative NoC	Entity theory	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Change is bad	-.18**	.83***	.45***	1								
2. Change is good	.79***	-.16*	-.44***	-.41***	1							
3. Change is unpredictable	.00	.92***	.24***	.60***	-.02	1						
4. Change is predictable	.66***	.11†	.14*	.18**	.22***	.04	1					
5. Change is uncontrollable	-.11†	.77***	.38**	.58**	-.10	.65***	.06	1				
6. Change is controllable.	.85***	-.08	-.24***	-.14*	.61***	-.01	.40***	-.19**	1			
7. Things change- negative	-.08	.95***	.30***	.77***	-.17**	.88***	.08	.74***	-.08	1		
8. Things change- positive	.92***	-.10	-.22***	-.24***	.78***	-.03	.66***	-.06	.68***	-.12†	1	
9. People change- negative	.05	.84***	.27***	.65***	-.02	.84***	.14*	.54***	.04	.66***	.02	1
10. People change- positive	.94***	-.04	-.22**	-.10	.70***	.02	.58***	-.13*	.89***	-.05	.74***	.06

Note. †*p*<.10, **p*<.05, ***p*<.01, ****p*<.001; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 4

Correlations between nature of change beliefs and ratings of self-generated (SG) and researcher generated (RG) words- Study 2

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Positive NoC	1									
2. Negative NoC	-.32***	1								
3. Implicit theories	-.19*	.31***	1							
4. SG: positivity ratings	.45***	-.24**	-.30***	1						
5. SG: controllability ratings	.31***	-.11	.02	.28***	1					
6. SG: predictability ratings	.38***	-.07	.00	.43***	.45***	1				
7. RG: change words- positivity	.42***	-.24**	-.20*	.17*	.08	.54***	1			
8. Neutral RG characteristics	.33***	-.05	-.28***	.40***	.10	.21**	.43***	1		
9. Positive RG characteristics	.41***	-.22**	-.16*	.39***	.14†	.01	.79***	.43***	1	
10. Negative RG characteristics	.14†	.27**	-.13	.08	.24**	.29**	-.23**	.33***	-.17*	1
11. RG: filler items	.44***	-.15†	-.28***	.52***	.21*	.16†	.76***	.55***	.73***	.01

Partial correlations of key variables, controlling for positivity ratings of filler items- Study 2

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
2. Negative NoC	-.29***	1								
3. Implicit theories	-.08	.28**	1							
4. SG: positivity ratings	.29***	-.19*	-.18*	1						
5. SG: controllability ratings	.25**	-.09	.08	.21**	1					
6. SG: predictability ratings	.35***	-.05	.05	.42***	.43***	1				
7. RG: positivity	.14†	-.20*	.02	.26**	.03	-.07	1			
8. Neutral RG characteristics	.12	.04	-.16*	.16*	-.01	.15†	.03	1		
9. Positive RG characteristics	.15†	-.16*	.07	.02	-.02	-.16*	.54***	.05	1	
10. Negative RG characteristics	.16†	.28**	-.14†	.09	.25**	.23**	-.36***	.39***	-.26**	1

Note. †*p*<.10, *p<.05, **p<.01, ***p<.001; Abbreviations above can be interpreted as: Nature of Change scale (NoC). RG characteristics refer to the characteristics of change aggregate, see Table 5.

Table 5

Correlations: Researcher generated change-words and characteristics of change with NoC beliefs and implicit theories- Study 2

	Mean (SD)	Positive NoC	Negative NoC	Implicit theories (entity is high)
Change words	5.46 (0.89)	.42**	-.24**	-.20*
Adapt	5.27 (1.22)	.22**	-.11	-.12
Alter	4.51 (1.14)	.38***	-.05	-.06
Evolve	5.62 (1.40)	.34***	-.20*	-.21*
Develop	5.55 (1.22)	.35***	-.16†	-.10
Growth	6.05 (1.20)	.17**	-.24**	-.14†
Improvement	6.23 (1.22)	.29***	-.25**	-.12
Progress	5.94 (1.15)	.31***	-.26**	-.19*
Opportunity	5.78 (1.26)	.27**	-.25**	-.13
Characteristics of Change				
"neutral" descriptors	**4.40 (0.72)**	**.33****	**-.05**	**-.28****
Changing	4.49 (1.27)	.36***	-.22**	-.13
Different	4.36 (1.30)	.19*	-.06	-.18*
Malleable	4.45 (1.40)	-.09	.02	-.06
Unknown	3.24 (1.46)	.09	.12	-.20*
Expect	4.91 (1.24)	.27**	.01	-.08
Beginning	4.93 (1.28)	.30***	-.13	-.18*
"positive lean"	**5.24 (0.85)**	**.41****	**-.22****	**-.16**
Control	4.73 (1.50)	.29***	.10	.04
Exciting	5.83 (1.21)	.19*	-.18*	-.12
Predictable	4.73 (1.34)	.37**	-.09	-.04
Potential	5.50 (1.27)	.32***	-.23**	-.23**
Innovative	5.82 (1.33)	.14†	-.35***	-.13
Surprise	4.84 (1.38)	.26**	-.11	-.15†
"negative lean"	**2.87 (0.99)**	**.14†**	**.27****	**-.13**
Uncertain	2.99 (.73)	.02	.21*	-.17*
Random	3.94 (1.37)	.14†	.17*	-.13
Chaotic	2.28 (1.50)	.12	.24**	.00
Inconsistent	2.46 (1.32)	.08	.19*	-.14†
Indecisive	2.49 (1.32)	.12	.17*	-.16†
Risk	2.97 (1.40)	.06	.15†	-.06
Flighty	2.97 (1.52)	.16*	.20*	.00

Note. †*p*<.10, **p*<.05, ***p*<.01, ****p*<.001; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 6

Correlations between research-generated filler items and key variables- Study 2

Filler Items	Means (SD)	Positive NoC	Negative NoC	Implicit Theories
Pace	4.48 (1.05)	.26**	-.07	-.12
Whether	4.27 (1.06)	.25**	.12	-.17*
Experience	5.44 (1.25)	.29***	-.12	-.20*
Think	5.66 (1.29)	.34**	-.17*	-.13
System	4.34 (1.29)	.33***	-.03	.01
Feel	4.85 (1.31)	.39**	-.18*	-.27**
Discuss	4.99 (1.33)	.25**	-.14†	-.17*
Question	4.43 (1.42)	.09	-.17*	-.30***
Connect	5.51 (1.30)	.29***	-.19*	-.20*
Place	4.83 (1.22)	.26**	.05	-.17*
Understand	5.87 (1.20)	.23**	-.16†	-.10
Need	4.13 (1.25)	.19*	.01	-.14†
Run	4.35 (1.30)	.21*	-.02	-.16†

Note. †$p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$; Abbreviations above can be interpreted as:
Nature of Change scale (NoC)

Table 7

Correlations between secondary measures- Study 2

Variables	1.	2.	3.	4.	5.
2. Positive NoC	1				
3. Negative NoC	-.32***	1			
3. Entity Beliefs	-.19*	.31***	1		
4. Rosenberg self-esteem scale	.26**	-.35***	-.12	1	
5. Perceived control	.37***	-.22**	-.33***	.48**	1
6. Need for cognitive closure	.09	.16*	.35***	-.11	.01

Note. †*p*<.10, **p*<.05, ***p*<.01, ****p*<.001; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 8

Linear regressions predicting natural ability beliefs and effort beliefs- Study 3

Variable	B	$(SE)\ B$	β	ΔR^2	95% CI
Natural ability beliefs					
Step 1				.01	
Implicit theories premeasure	.06	.06	.08		[-.05, .17]
Step 2				.23***	
Implicit theories premeasure	.04	.05	.05		[-.06, .14]
Negative NoC beliefs	.38	.08	.31***		[.22, .53]
Positive NoC beliefs	.56	.09	.38**		[.38, .75]
Effort beliefs					
Step 1				.04**	
Implicit theories premeasure	-.14	.05	-.19**		[-.24, -.04]
Step 2				.13***	
Implicit theories premeasure	-.09	.05	-.13†		[-.18, .00]
Negative NoC beliefs	-.19	.08	-.17*		[-.34, -.04]
Positive NoC beliefs	.45	.09	.32***		[.27, .63]

Note. $^\dagger p<.10$, $^*p<.05$, $^{**}p<.01$, $^{***}p<.001$; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 9

Correlations between NoC beliefs, natural ability beliefs, effort beliefs, individual differences, and self-perceptions of success (SPS)- Study 3

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Positive NoC	1										
2. Negative NoC	-.04	1									
3. Implicit theories	-.10	.21**	1								
4. Natural ability beliefs	.36***	.30**	.08	1							
5. Effort beliefs	.34***	-.21**	-.19**	.34***	1						
6. Prevention orientation	.11	-.17*	-.06	.08	.21**	1					
7. Promotion orientation	.21**	-.33***	-.05	.05	.42**	.24***	1				
8. Self-esteem	.27***	-.31***	.01	.04	.39***	.25***	.71***	1			
9. LOT-R	.40***	-.41***	-.09	.11	.38***	.18*	.64***	.75***	1		
10. SPS- general	.26***	-.14†	-.01	.17*	.18*	.15*	.55***	.63***	.54***	1.	
11. SPS- relationships	.32***	-.16*	.00	.23**	.36***	.12	.54***	.61***	.55***	.64***	1
12. SPS- work	.32**	-.09	.05	.25***	.36***	.15*	.55***	.67***	.55***	.71***	.57***

Note. †$p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$; Abbreviations above can be interpreted as: Nature of Change scale (NoC), Life-Orientation Test, Revised (LOT-R)

Table 10
Correlations with belief in effort and key predictors- Study 4

Variables	1.	2.	3.
1. Negative NoC	1		
2. Positive NoC	-.30***	1	
3. Implicit Theories (pre)	-.39***	.30***	1
4. Belief in effort	-.49***	.32***	.49***

Note. †*p*<.10, *p<.05, **p<.01, ***p<.001; ; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 11

Correlations with conditions and key predictors- Study 4

Condition	Positive NoC	Negative NoC	Implicit Theories (pre)	Implicit Theories (post)	Belief in effort
Improvement	.33***	-.47***	.86***	.92***	.60***
Random Change	.22*	-.27**	.78***	.83***	.31***
Decline	.16†	-.21*	.74***	.72***	.48***
Control	.37***	-.29***	.78**	.89***	.46***

Note. †*p*<.10, **p*<.05, ***p*<.01, ****p*<.001; ; Abbreviations above can be interpreted as: Nature of Change scale (NoC)

Table 12
Z score differences in condition correlations for effort beliefs- Study 4

	1.	2.	3.
1. Improvement			
2. Random change	2.88**		
3. Decline	1.31	-1.51	
4. Control	1.63	-1.41	.22

Note. †*p*<.10, *p<.05, **p<.01, ***p<.001.

Table 13

Linear regressions predicting effort beliefs from directional change- Study 4

Variable	B	(SE) B	β	ΔR²	95% CI
Improvement					
Step 1				.34***	[.25, .43]
Implicit theories premeasure	.34	.04	.58**		
Step 2				.04**	
Implicit theories premeasure	.14	.08	.24†		[-.02, .30]
Improvement is possible	.28	.10	.41**		[.09, .47]
Step 3				.06**	
Implicit theories premeasure	.11	.08	.19		[-.05, .27]
Improvement is possible	.23	.10	.33*		[.04, .42]
Positive NoC beliefs	-.04	.10	-.03		[-.23, .15]
Negative NoC beliefs	-.28	.08	-.28**		[-.44, -.13]
Random Change					
Step 1				.20***	
Implicit theories premeasure	.26	.05	.45***		[.16, .35]
Step 2				.00	
Implicit theories premeasure	.29	.08	.50***		[.14, .44]
Random change is possible	-.04	.08	-.07		[-.21, .12]
Step 3				.15***	
Implicit theories premeasure	.18	.07	.30*		[.03, 32]
Random change is possible	-.03	.08	-.05		[-.18, 12]
Positive NoC beliefs	.21	.10	.18*		[.02, .39]
Negative NoC beliefs	-.42	.10	-.35***		[-.62, -.23]

Variable	B	(SE) B	β	ΔR²	
Decline					
Step 1				.19***	
Implicit theories premeasure	.29	.06	.44***		[.18, .40]
Step 2				.05**	
Implicit theories premeasure	.13	.08	.19		[-.03, .28]
Decline is possible	.27	.10	.34**		[.08, .46]
Step 3				.10**	
Implicit theories premeasure	.03	.08	.05		[-.13, .19]
Decline is possible	.29	.09	.37**		[.11, .47]
Positive NoC beliefs	.08	.11	.06		[-.14, .31]
Negative NoC beliefs	-.32	.09	-.30**		[-.50, -.13]
Control (Undefined change)					
Step 1				.25***	
Implicit theories premeasure	.29	.04	.50***		[.21, .37]
Step 2				.01	
Implicit theories premeasure	.22	.07	.38**		[.09, .35]
Change is possible	.09	.07	.16		[-.04, 23]
Step 3				.18***	
Implicit theories premeasure	.13	.06	.23*		[.01, .25]
Change is possible	.05	.06	.09		[-.07, .18]
Positive NoC beliefs	.24	.07	.24**		[.10, .38]
Negative NoC beliefs	-.33	.07	-.35**		[-.46, -.20]
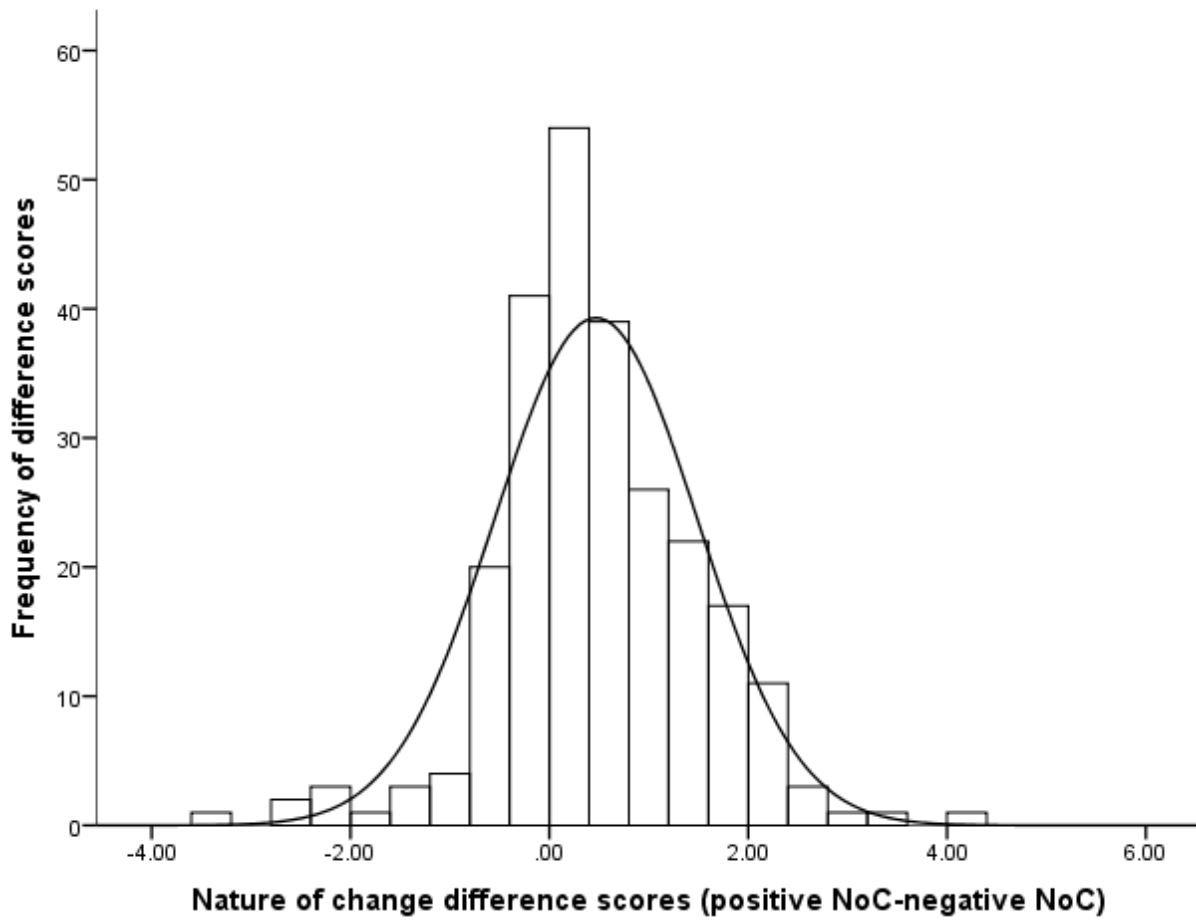
Figure 1. Study 1- Distribution of the nature of change difference scores (positive Nature of Change- negative NoC).

Appendix A

Rosenberg Self-Esteem Scale (Rosenberg, 1965)

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree					Strongly Agree

1. I feel that I'm a person of worth, at least on an equal basis with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure. (reverse coded)
4. I am able to do things as well as most people.
5. I feel I do not have much to be proud of. (reverse coded)
6. I take a positive attitude toward myself.
7. I have high self-esteem.
8. On the whole, I am satisfied with myself.
9. I wish I could have more respect for myself. (reverse coded)
10. I certainly feel useless at times. (reverse coded)
11. At times, I think I am no good at all. (reverse coded)

Perceived Control Scale- (Smith, Kohn, Savage-Stevens, Finch, Ingate, & Lim, 2000)

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree					Strongly Agree

1. The events in my life are mainly determined by my own actions.
2. I am not in control of most things that occur in my life.
3. People have control over whether or not they succeed in reaching their goals.
4. There are actions people can take to change their circumstances.

Need for Cognitive Closure Scale (Webster & Kruglanski, 1994)

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree					Strongly Agree

1. I don't like situations that are uncertain.
2. I dislike questions which could be answered in many different ways.
3. I find that a well ordered life with regular hours suits my temperament.
4. I feel uncomfortable when I don't understand the reason why an event occurred in my life.
5. I feel irritated when one person disagrees with what everyone else in a group believes.
6. I don't like to go into a situation without knowing what I can expect from it.
7. When I have made a decision, I feel relieved.
8. When I am confronted with a problem, I'm dying to reach a solution very quickly.
9. I would quickly become impatient and irritated if I would not find a solution to a problem immediately.
10. I don't like to be with people who are capable of unexpected actions.
11. I dislike it when a person's statement could mean many different things.
12. I find that establishing a consistent routine enables me to enjoy life more.
13. I enjoy having a clear and structured mode of life.
14. I do not usually consult many different opinions before forming my own view.
15. I dislike unpredictable situations.

Single-Item Life Satisfaction Measure (Lucas & Donnellan, 2012)

All things considered, how satisfied are you with your life as a whole nowadays?

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Extremely dissatisfied										*Extremely satisfied*

Regulatory Focus Scale (Higgins et al, 2001)

Instructions: This set of questions asks you HOW FREQUENTLY specific events actually occur or have occurred in your life. Please indicate your answer to each question by selecting the appropriate number next to it.

Never or Seldom		*Sometimes*		*Very Often*
1	*2*	*3*	*4*	*5*

1. Compared to most people, are you typically unable to get what you want out of life?
2. Growing up, would you ever "cross the line" by doing things that your parents would not tolerate?
3. How often have you accomplished things that got you "psyched" to work even harder?
4. Did you get on your parents' nerves often when you were growing up?
5. How often did you obey rules and regulations that were established by your parents?
6. Growing up, did you ever act in ways that your parents thought were objectionable?
7. Do you often do well at different things that you try?
8. Not being careful enough has gotten me into trouble at times.
9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do.
10. I feel like I have made progress toward being successful in my life.
11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

Implicit Theories of Personality (Chiu, Hong, & Dweck, 1997)

Instructions: Please indicate the extent to which you agree or disagree with each of the following statements.

1 *Strongly disagree*	*2* *Disagree*	*3* *Somewhat disagree*	*4* *Somewhat agree*	*5* *Agree*	*6* *Strongly agree*

1. The kind of person someone is, is something very basic about them and it can't be changed very much.
2. People can do things differently, but the important parts of who they are can't really be changed.
3. Everyone, no matter who they are, can significantly change their basic characteristics.
4. As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.
5. People can always substantially change the kind of person they are.
6. Everyone is a certain kind of person, and there is not much that can be done to really change that.
7. No matter what kind of person someone is, they can always change very much.
8. All people can change even their most basic qualities.

Optimism-Revised Orientation Test (Scheier, Carver, & Bridges, 1994)

Instructions: Please indicate how much you agree/disagree with the following statements:

1	*2*	*3*	*4*
Strongly disagree	*Disagree*	*Agree*	*Strongly agree*

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.

Overall, I expect more good things to happen to me than bad.

Demographic Questionnaire (used in all four studies)

1. Please indicate your age.

2. From the following, please select the option that best reflects your gender.
    _ Male
    _ Female
    _ Other *(please specify)* _____

3. Please indicate your country of residence.
    _ Canada
    _ United States
    _Other (*please specify)*

4. Is English your first language?
    _Yes
    _ No

5. Please indicate your current household income in U.S. dollars.
    _ Rather not say
    _ Under $10,000
    _ $10,000-$19,999
    _ $20,000-$29,999
    _ $30,000-$39,999
    _ $40,000-$49,999
    _ $50,000-$74,999
    _ $75,000-$99,999
    _ $100,000-$150,000
    _ Over $150,000

6. To what degree does your household income make you feel uncertain?
    _ Not at all uncertain
    _ Very little uncertainty
    _ Neither Uncertain nor Certain
    _ Somewhat uncertain
    _ Very Uncertain

7. Are your economic needs being met by your current household income?
    _ Strongly disagree
    _ Disagree

_ Somewhat disagree
_ Somewhat agree
_ Agree
_ Strongly agree

8. From the following, please select the racial group with which you primarily identify.
    _ Non-Hispanic White or Euro-American
    _ Black, Afro-Caribbean, or African American
    _ Latino or Hispanic
    _ East Asian or Asian American
    _ South Asian or Indian American
    _ Middle Eastern or Arab American
    _ First Nations, Métis, Inuit, Native American, or Alaskan Native
    _ Other (please specify) _____

9. Using the following slider bar, please indicate (by sliding the dot) the point that you
    believe best represents your political orientation.

    _____|_____
                    100% Liberal   100% Conservative
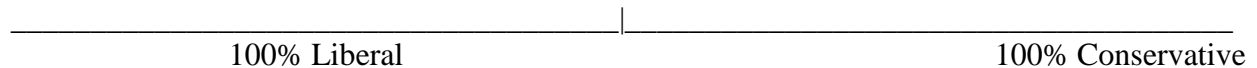
10. Religious affiliation or belief system:
    _ No religious affiliation/belief system
    _ Christian (e.g. Catholic, Protestant, Lutheran)
    _ Muslim (e.g. Shia, Sunni)
    _ Jewish (e.g. Orthodox, Reform)
    _ Hindu
    _ Sikh
    _ Atheist
    _ Agnostic
    _ Buddhist
    _ Spiritual but not religious
    _ Other (please specify) _____

11. How important is your religious affiliation or belief system to you?
   _ Not at all Important
   _ Very Unimportant
   _ Somewhat Unimportant
   _ Neither Important nor Unimportant
   _ Somewhat Important
   _ Very Important
   _ Extremely Important

Appendix B
Nature of Change Scales

Positive Nature of Change

Instructions: Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements, by selecting the number that corresponds to your opinion in the space underneath each statement.

| *Strongly disagree* | *Disagree* | *Somewhat disagree* | *Somewhat agree* | *Agree* | *Strongly agree* |

Change is good subscale:
1. Usually, when someone changes their mind, it's because their thinking has grown or evolved.
2. When things change, it is usually for the better.
3. When things change, it usually reflects upward growth or improvement.
4. When people change, it usually means their life has improved.
5. When I think about things changing, I can't help but think positively.
6. Change usually means people are developing or growing.[6]
7. When someone does not change, it means that they are stagnating or at a standstill.[3]
8. When things do not change, I feel bored.[6]
9. Overall, I like when there is change in my life.[6]
10. I see change as a positive challenge.[6]
11. When someone does not change, it means they are in a rut.[6]

Change is predictable subscale
1. When things change, it is usually in a predictable way.
2. The consequences of change are usually predictable.
3. When people change, it is not in a way that surprises me.
4. People really only change in ways you would expect.[7]
5. People really only change in predictable ways.[6]

Change is controllable subscale
1. When I think of change in my own life, I think of changes that I will make.
2. People have control over whether or not they change.
3. People usually have control over whether things in their life change.
4. When things change, it is usually in a controllable way.
5. When a person changes, it is usually due to factors within their control.
6. When a person changes, it's because they're consciously trying to change themselves.[6]

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[6] Deleted after study 1
[7] Added after study 1

Negative Nature of Change

Instructions: Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements, by selecting the number that corresponds to your opinion in the space underneath each statement.

| *Strongly disagree* | *Disagree* | *Somewhat disagree* | *Somewhat agree* | *Agree* | *Strongly agree* |

Change is bad subscale
1. Usually, when someone changes their mind, it's because they're flighty or indecisive.
2. When things change, it is usually for the worse.
3. When I think about things changing, I automatically think negatively.
4. When things change, it usually reflects decline.
5. When someone does not change, it means that they are solid and dependable.[8]
6. When things do not change, I feel safe.[8]
7. Change is more often negative than positive.[8]
8. Overall, I prefer that my life is stable.[8]
9. I see change as an unwanted challenge.[8]

Change is unpredictable subscale
1. Change usually just means people are being inconsistent or unpredictable.
2. When things change, you cannot be certain of the consequences.
3. When I think of life changes, I think of all the changes I might not expect.
4. When things change in my life, it usually surprises me.
5. When people change, it is not usually in a predictable way.
6. I am usually surprised by the way people change.
7. When things change, it is usually random or chaotic.

Change is uncontrollable subscale
1. Most change happens due to factors outside of a person's control.
2. When things change, it is typically in an uncontrolled way.
3. People have little control over the change that occurs in their life.[9]
4. Things usually occur outside of one's control.[8]
5. People cannot change themselves, but are only changed by outside forces like life experiences.[9]
6. When life changes occur, it is usually due to factors outside of a person's control.[9]

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[8] Deleted after Study 1
[9] Added after Study 1

Appendix C
Study 1 Materials

Open ended questions

1. List five words that come to mind when you think of the word 'school'.

2. List five words that come to mind when you think of the word "change".

3. List five words that come to mind when you think of the word 'walk'.

4. List five synonyms or related concepts that come to mind when you think of the word "change".

5. List five synonyms or related concepts that come to mind when you think of the word 'artifact'.

6. When people change, it means they have...

Supplementary Nature of Change Items

Instructions: Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements, by selecting the number that corresponds to your opinion in the space underneath each statement.

Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. I think that personal growth is important.
2. When someone changes their mind, it's because they are untrustworthy.
3. When someone changes their mind, it is usually for a good reason.
4. It is important to me to remain consistent in who I am.
5. I feel the most open to change when everything else in my life is stable.
6. When things change in my life, it usually surprises me.
7. Change is a normal part of life and something to be expected.
8. The thought of change scares me.
9. I am comfortable with change.
10. This is an attention check. Please select "Strongly Agree" for this question.
11. When things change quickly, I am often uncomfortable.
12. I find I am well-suited to fast change.
13. I am most comfortable with change when it occurs slowly.
14. I find myself seeking change.
15. My opinions sometimes change or vary.
16. Though I am open to new information, generally my opinions do not change over time.
17. As someone learns new information and gains life experience, their perspective on the world will change.
18. Social change usually means things are volatile and unstable.
19. Social change usually reflects desirable societal progress.
20. Social change is most meaningful when it happens slowly.
21. Rapid social change often improves society as a whole.
22. When I think about change, I feel anxious.
23. The thought of change makes me feel excited.
24. Life without change lacks meaning.
25. Change makes me nervous.
26. I feel confident in times of change.
27. I think I am good at adapting to change.
28. Though I can adapt to change, I would prefer if things stayed the same.
29. I am not good at adapting to change.
30. Life with too much change is too chaotic and random.

Appendix D
Study 2 Materials

Open-ended questions about change

Instructions: We are interested in ideas associated with 'change'. Please answer the following questions about 'change' as honestly as possible.

1. Please write five words that come to mind when you think of the word "change".

2. Please write five synonyms of the word "change".

Rating self-generated words

Positive/Negative instructions: Please rate how positive or negative the following words are, in your view.

> *Participants were shown their self-generated words and responded on a slider scale from Negative (0) to Positive (100), with 50 as a marked midpoint.*

Predictable/Unpredictable instructions: For the following words, please consider the extent to which you personally associate each word with a sense of predictability or unpredictability. For example, people might most often associate the word "surprise" with unpredictability. However, there are no right or wrong answers - go with your gut feeling or first impression. For example, one person might associate the word "different" with being unpredictable and another person might see it as predictable.

> *Participants were shown their self-generated words and responded on a slider scale from Unpredictable (0) to Predictable (100), with 50 as a marked midpoint.*

Controllable/Uncontrollable instructions: For the following words, please consider the extent to which you personally associate each word with a sense of controllability or uncontrollability. For example, people might most often associate the word "random" with uncontrollability. However, there are no right or wrong answers - go with your gut feeling or first impression. For example, one person might associate the word "different" with being uncontrollable and another person might see it as controllable.

> *Participants were shown their self-generated words and responded on a slider scale from Uncontrollable (0) to Controllable (100), with 50 as a marked midpoint.*

Researcher Generated Words

Instructions: Please rate how positive or negative the following words are.

1	2	3	4	5	6	7
Extremely negative	*Moderately negative*	*Slightly negative*	*Neither positive nor negative*	*Slightly positive*	*Moderately positive*	*Extremely positive*

Change words
1. Growth
2. Improvement
3. Develop
4. Adapt
5. Alter
6. Opportunity
7. Progress
8. Evolve

Characteristics of Change
1. Surprise
2. Flighty
3. Predictable
4. Uncertain
5. Control
6. Expect
7. Chaotic
8. Inconsistent
9. Indecisive
10. Innovative
11. Random
12. Different
13. Exciting
14. Unknown
15. Changing
16. Uncertain
17. Radical
18. Risk
19. Malleable

Filler Items
1. Pace

2. Whether
3. Experience
4. Think
5. Consequences
6. System
7. Feel
8. Discuss
9. Allow
10. Question
11. Connect
12. Place
13. Understand
14. Potential
15. Need
16. Beginning
17. Run
18. New

Appendix E
Study 3 Materials

Perceived success

Strongly disagree	*Disagree*	*Somewhat disagree*	*Neither agree nor disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. In your life, to what extent would you say you feel successful? ("Strongly agree" would imply that you feel very successful)

2. In your life, to what extent would you say you feel successful in your relationships? ("Strongly agree" would imply that your relationships are/have been very successful)

3. In your life, to what extent would you say you feel successful in your work? ("Strongly agree" would imply that you are/have been very successful in your work).

Attributions of success items

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

1. I know I am successful when...
    a. I am doing better than the average person *(natural ability/skill)*
    b. I have mastered a skill *(effort/mastery)*
    c. I have reached my personal goals *(effort/mastery)*
    d. I have accomplished more than my peers *(natural ability/skill)*

2. At my job/career, my personal meter of success is...
    a. Making more money than my peers *(natural ability/skill)*
    b. Getting praise from my superiors *(natural ability/skill)*
    c. Achieving goals that I set for myself *(effort/mastery)*
    d. Enriching my skill set *(effort/mastery)*

3. In my relationships with my loved ones, I know I am succeeding if...
    a. Other people tell me they are jealous of my relationship *(natural ability/skill)*
    b. We seem happier than other couples *(natural ability/skill)*
    c. I feel happy *(filler)*
    d. My partner and I feel that we are the couple we want to be *(effort/mastery)*

4. I know I have succeeded when...
    a. I have put in the effort and it has paid off *(effort/mastery)*
    b. When I receive recognition for my abilities *(natural ability/skill)*

5. In school, I feel/felt good about myself when...
    a. I did better than the class average on a test *(natural ability/skill)*
    b. When I met a personal best *(effort/mastery)*
    c. When a teacher or leader told me I was doing well *(natural ability/skill)*
    d. When I mastered a skill or lesson *(effort/mastery)*

6. If I succeed at something, it is because...
    a. I have worked hard and improved *(effort/mastery)*
    b. It is an area in which I already excel *(natural ability/skill)*
    c. I had the opportunity to prove my ability *(natural ability/skill)*
    d. I acquired a new skill that helped me achieve a goal *(effort/mastery)*

7. If I struggled with something in school...
   a. I could improve by changing my study methods *(effort/mastery)*
   b. I probably wouldn't get much better at it *(natural ability/skill)*
   c. It was a fluke because I was usually good at most school subjects *(natural ability/skill)*
   d. It is because I didn't put in the required effort to do better *(effort/mastery)*

Appendix F

Study 4 Materials

Pre-measure of Implicit Theories of Personality Scale (taken from Chiu, Hong, & Dweck, 1997)

| *Strongly disagree* | *Disagree* | *Somewhat disagree* | *Somewhat agree* | *Agree* | *Strongly agree* |

1. Everyone is a certain kind of person, and there is not much that can be done to really change that.
2. All people can change even their most basic qualities.

Precisely-defined change scales: Improvement

Instructions: Please indicate the extent to which you agree or disagree with each of the following statements.

1	2	3	4	5	6
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. The kind of person someone is, is something very basic about them and it can't be improved very much.
2. People can do things differently, but the important parts of who they are can't really be improved.
3. Everyone, no matter who they are, can have even their most basic characteristics get better.
4. The kind of person someone is can always substantially change for the better.
5. No matter what kind of person someone is, they can always improve very much.
6. Even people's most basic qualities can improve.

Precisely-defined change scales: Random Change

Instructions: Please indicate the extent to which you agree or disagree with each of the following statements.

1	2	3	4	5	6
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. The kind of person someone is, is something very basic about them and can't change unpredictably.
2. People can do things differently, but the important parts of who they are can't really randomly change.
3. Everyone, no matter who they are, can have even their most basic characteristics unpredictably change.
4. No matter what kind of person someone is, they can always change in a unpredictable ways.
5. The kind of person someone is can always substantially change in random and unpredictable ways.
6. Even people's most basic qualities can change randomly or unpredictably.

Precisely-defined change scales: Decline

Instructions: Please indicate the extent to which you agree or disagree with each of the following statements.

1	2	3	4	5	6
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. The kind of person someone is, is something very basic about them and it can't really change for the worse.
2. People can do things differently, but the important parts of who they are can't really get worse.
3. Everyone, no matter who they are, can have even their most basic characteristics decline.
4. The kind of person someone is can always substantially change for the worse.
5. No matter what kind of person someone is, they can always change for the worse.
6. Even people's most basic qualities can decline.

Precisely-defined change scales: Control condition

Instructions: Please indicate the extent to which you agree or disagree with each of the following statements.

1	2	3	4	5	6
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. The kind of person someone is, is something very basic about them and it can't be changed very much.
2. People can do things differently, but the important parts of who they are can't really be changed.
3. Everyone, no matter who they are, can change even their most basic characteristics.
4. The kind of person someone can always substantially change.
5. No matter what kind of person someone is, they can always change very much.
6. Even people's most basic qualities can change

Post-measure of implicit theories (taken from Chiu, Hong, & Dweck, 1997)

1	*2*	*3*	*4*	*5*	*6*
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.
2. All people can change even their most basic qualities.
3. Everyone is a certain kind of person and there's not much that can be done to change that.

Effort beliefs scale (developed by researchers)

1	2	3	4	5	6
Strongly disagree	*Disagree*	*Somewhat disagree*	*Somewhat agree*	*Agree*	*Strongly agree*

1. The things people do well are mainly due to natural ability, not how much effort they put in. *(reverse coded)*
2. Through increased effort, people can get significantly better at something.
3. Even for things people do poorly, I know anyone can do a lot better if they work harder at it.
4. If people do poorly at something, it is usually because they do not have the natural ability. *(reverse coded)*
5. If people succeed at something, it is because they worked hard for it.
6. The things people succeed at are things that they have a natural aptitude for. *(reverse coded)*

Appendix G

Supplementary Analyses

Correlations between subscales and key variables- Study 3

	Natural ability beliefs	Hard work beliefs	Entity theory	Positive NoC	Negative NoC
Change is good	.25***	.32***	-.07	.86***	-.11
Change is predictable	.24**	-.12†	.12†	.57***	.29***
Change is controllable	.34***	.49***	-.21**	.83***	-.16*
Change is bad	.24***	-.36***	.20**	-.03	.81***
Change is unpredictable	.32***	-.07	.11	.04	.90***
Change is uncontrollable	.19**	-.11	.24**	-.13†	.83***
Things change- good	.31***	.16*	-.02	.87***	.02
Things change – bad	.30***	-.15*	.17*	-.07	.96**
People change- good	.36***	.40***	-.11	.94***	-.02
People change- bad	.33***	-.24**	.19**	.07	.91***

Note. †*p*<.10, *p<.05, **p<.01, ***p<.001

Correlations between key variables and subscales- Study 4

	Negative NoC	Positive NoC	Incremental Theory	Improvement	Random change	Decline	Belief in effort
Change is good	-.32***	.84***	.34***	-.29**	-.23*	-.15	.38**
Change is predictable	.07	.62***	-.05	.05	.01	.11	-.12**
Change is controllable	-.39***	.87***	.36***	-.43***	-.21*	-.26**	.43***
Change is bad	.81***	-.25***	-.38***	.31**	.26**	.09	-.54***
Change is unpredictable	.90***	-.16***	-.27***	.25**	-.03	-.01	-.40**
Change is uncontrollable	.84***	-.35***	-.29***	.27**	.12	-.02	-.35***
Things change-bad	.95***	-.29***	-.36***	.33***	.12	-.02	-.43***
Things change-good	-.24***	.91***	.21***	-.17†	-.15†	-.08	.16***
People change-bad	.86***	-.18***	-.31***	.27**	.11	.03	-.48***
People change-good	-.31***	.94***	.33***	-.39***	-.18*	-.19*	.41**

Note. †$p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$

Exploratory Factor Analysis (oblimin rotation), pattern matrix demonstrating the factor loadings for each of the NoC items (both positive and negative)- Study 1

	1	2	3	4	5	6
Negative NoC items						
Change usually just means people are being inconsistent or unpredictable.	.122	.713	.078	-.145	.148	-.149
Usually, when someone changes their mind, it's because they're flighty or indecisive.	.013	.733	.128	-.007	.024	-.171
When things change, it is usually random or chaotic	.267	.282	.519	.065	-.045	-.090
When things change, it is usually for the worse.	.522	.283	.227	.269	-.080	-.089
When I think about things changing, I automatically think negatively.	.501	.332	.256	.051	-.046	-.237
When things change, it usually reflects decline.	.573	.388	.335	.196	.022	.027
When I think of life changes, I think of all the changes I might not expect.	.022	.059	.027	.079	.102	-.667
When things change, you cannot be certain of the consequences.	.220	-.343	.521	.046	.147	-.358
When things change in my life, it usually surprises me.	-.075	.073	.531	-.114	.021	-.280
When things change, it is typically in an uncontrolled way.	-.072	-.016	.683	-.256	-.022	-.130
Most change happens due to factors outside of a person's control.	-.026	.149	.765	-.108	-.091	.097
When people change, it is not usually in a predictable way.	-.025	.065	.056	-.055	-.123	-.749
I am usually surprised by the way people change.	-.295	.184	.386	.072	-.411	-.229
Positive NoC Items						
Usually, when someone changes their mind, it's because their thinking has grown or evolved.	-.238	-.356	.143	.324	-.015	-.257
When things change, it is usually for the better.	-.729	.224	-.117	.067	.072	-.193
When I think about things changing, I can't help but think positively.	-.603	-.058	.155	.226	.164	.102
When things change, it usually reflects upward growth or improvement.	-.796	.014	.061	.163	-.092	-.053
When people change, it usually means their life has improved.	-.721	-.025	.282	.163	.035	.074
When things change, it is usually in a predictable way.	.012	.094	.392	.232	.576	.369
When I think of change in my own life, I think of changes that I will make.	-.229	-.248	-.016	.534	.062	-.179

The consequences of change are usually predictable.	-.107	.027	.064	-.059	.785	.021
When things change, it is usually in a controllable way.	-.305	.235	-.081	.429	.185	.066
People have control over whether or not they change.	-.063	.000	-.054	.751	-.173	.054
When a person changes, it is usually due to factors within their control.	.104	-.041	-.154	.797	.142	.007
People usually have control over whether things in their life change.	-.130	.290	-.181	.564	.212	-.092
People really only change in predictable ways.	-.124	.611	.054	.199	.250	.131
When people change, it is not in a way that surprises me.	-.023	.142	-.198	.006	.756	-.206

Confirmatory Factor Analysis (oblimin rotation, constrained to two factors), pattern matrix demonstrating the factor loadings for each of the NoC items (both positive and negative)- Study 1

	1	2
Change usually just means people are being inconsistent or unpredictable.	.689	.053
Usually, when someone changes their mind, it's because they're flighty or indecisive.	.701	.175
When things change, it is usually random or chaotic	.736	-.076
When things change, it is usually for the worse.	.636	-.104
When I think about things changing, I automatically think negatively.	.737	-.225
When things change, it usually reflects decline.	.766	-.124
When I think of life changes, I think of all the changes I might not expect.	.388	.166
When things change, you cannot be certain of the consequences.	.414	-.073
When things change in my life, it usually surprises me.	.534	.013
When things change, it is typically in an uncontrolled way.	.501	-.156
Most change happens due to factors outside of a person's control.	.600	-.084
When people change, it is not usually in a predictable way.	.394	-.026
I am usually surprised by the way people change.	.354	.091
Usually, when someone changes their mind, it's because their thinking has grown or evolved.	-.107	.353
When things change, it is usually for the better.	-.127	.641
When I think about things changing, I can't help but think positively.	-.183	.656
When things change, it usually reflects upward growth or improvement.	-.247	.619
When people change, it usually means their life has improved.	-.122	.624
When things change, it is usually in a predictable way.	.285	.494
When I think of change in my own life, I think of changes that I will make.	-.154	.575
The consequences of change are usually predictable.	.103	.460
When things change, it is usually in a controllable way.	.007	.696
People have control over whether or not they change.	-.053	.547
When a person changes, it is usually due to factors within their control.	-.025	.639
People usually have control over whether things in their life change.	.129	.726
People really only change in predictable ways.	.411	.507
When people change, it is not in a way that surprises me.	.128	.478