



The Resilience Scale

Using Metaphor to Communicate a
Developmental Perspective on
Resilience

A FRAMEWORKS RESEARCH REPORT

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About FrameWorks Institute:

The FrameWorks Institute is an independent nonprofit organization founded in 1999 to advance science-based communications research and practice. The Institute conducts original, multi-method research to identify the communications strategies that will advance public understanding of social problems and improve public support for remedial policies.

The Institute's work also includes teaching the nonprofit sector how to apply these science-based communications strategies in their work for social change. The Institute publishes its research and recommendations, as well as toolkits and other products for the nonprofit sector, at www.frameworksinstitute.org.

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INTRODUCTION

The research presented here was conducted by the FrameWorks Institute for the Center on the Developing Child at Harvard University. The effort to develop and test explanatory metaphors is part of a larger ongoing project that employs multi-method social science research to study public understanding and design effective strategies to translate the science of early childhood development. Developing and testing explanatory metaphors, or what FrameWorks calls “*Simplifying Models*,” is vital to increasing accessibility to the science of early child development and its policy implications. The ultimate goal of this translational work is to lay a foundation of public understanding which can increase support for policies and programs that are most likely to improve the lives of children, thereby strengthening society as a whole.

Simplifying models are explanatory metaphors that channel ways in which people talk and reason about how a concept works and what can be done to improve it. FrameWorks’ previous translational work on early child development has produced tools for communicating about executive function, epigenetics, infant-caregiver interaction, and stress response. This work has repeatedly shown that, by fortifying understandings of abstract or complex phenomena, simplifying models are powerful tools in widening public understanding of science issues.

FrameWorks researchers have unpacked and distilled the public’s explicit and implicit understandings — what social scientists call cultural models¹ — of developmental determinants and processes, individual differences, and resilience. Comparing these cultural models with a set of science messages about these same issues (which can be found in distilled form in Appendix A) revealed a set of gaps in understanding. Chief among these gaps were conflicting understandings of 1) how developmental outcomes are shaped; 2) what resilience is; 3) what causes resilience; and 4) what can be done to improve outcomes, especially in the face of significant adversity. FrameWorks research has shown that these gaps impede widespread understanding of a developmental perspective of resilience, which in turn impacts support for public programs and policies. Therefore, a set of simplifying models was designed to address these specific gaps.

Despite the power of metaphor to bring public and expert understandings into greater alignment, we also note that simplifying models are not meant to function alone. Even the most apt, powerful metaphor cannot accomplish everything that needs to be done in reframing complex issues. Other frame elements (Values, Messengers, Visuals, Tone, Causal Chains, Social Math and additional Simplifying Models²) need to be woven into reframing stories. In addition, a simplifying model is never meant to replace content. FrameWorks’ framing tools are designed and tested for their effectiveness in *establishing a perspective*

from which carefully and clearly articulated science messages can be productively processed by policymakers and members of the general public, such that unproductive misinterpretations of intended messages are less likely to result. In this way, the current report should not be seen as a stand-alone solution to science translation problems, but rather as one in a series of tools and strategies that constitute an overarching Core Story of Early Child Development.³

EXECUTIVE SUMMARY

The *Resilience Scale* is an effective simplifying model for channeling thinking about developmental outcomes and resilience. The tool can be used to translate a wide range of messages from the science of early child development — from individual differences to gene-environment interaction to critical and sensitive periods and resilience. In addition, the metaphor has a wide range of ways in which it can be deployed. This variety of effective terms, phrases, and visual devices give users flexibility in deploying and leveraging this tool’s metaphorical power. Coupled with its empirically demonstrated effectiveness, this flexibility creates a potent translational device.

Below is a list of the core points of the simplifying model:

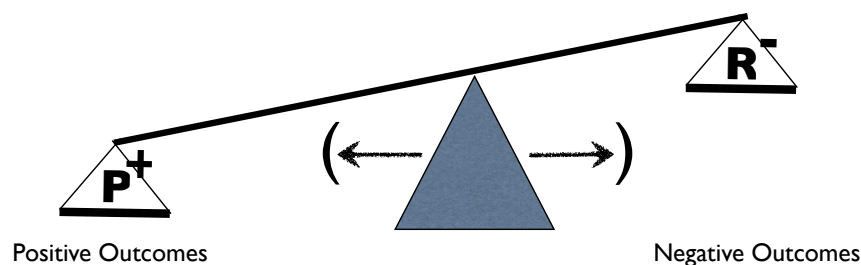
- You can think of a child’s life as a scale, and the things stacked on either side shape that child’s development.
- Scales have two sides onto which factors are stacked.
- The factors placed on either side determine how the scale tips, but factors don’t all weigh the same.
- We want children to have scales that tip positive.
- There is a fulcrum point that determines the effect of placing weight on either side — shaping how easily the arm of the scale tips in either direction.
- Children are born with a fulcrum point in a certain place, and its early position matters a lot, but it can also shift over time.
- Resilience is having a scale that’s tipped positive even when a lot of things are stacked on the negative side.
- Scales can be counterbalanced and calibrated so as to achieve different inclinations.

We also provide the following more-developed exposition to illustrate how these points may be brought to bear in discussing developmental outcomes and resilience.

In the same way that the weight sitting on a scale or teeter-totter affects the direction it tips, the factors that a child is exposed to affect the outcomes of their development. A child’s scale is placed in a community and has spaces on either side where environmental factors get placed. These factors influence which direction the scale tips and the outcomes of the child’s development. Development goes well when the scale tips positive. Positive factors, such as supportive relationships, get stacked on one side, while risk factors, such as abuse or violence, pile up on the other. It’s important to realize that not all these factors are the same weight. Resilience happens when the scale tips positive even though it’s stacked with negative weight. This happens when communities counterbalance the scale by

stacking protective factors like supportive relationships and opportunities to develop skills for coping and adapting. There's another part of the scale called the fulcrum, which is also important in how the scale tips. Different scales have different places where this fulcrum starts, just as children have different genetic starting points, and the position of this fulcrum influences how much positive weight it takes to tip the scale toward positive outcomes and how much negative weight it takes to send the scale tipping down toward negative outcomes. We also know that the fulcrum is not fixed — a child's experiences can cause the fulcrum to move in either direction, affecting how the scale works and what it takes to tip it either way. What's key is that there are certain periods during development where the fulcrum is especially shiftable. During these times, it's critical that children have positive experiences such that their fulcrums can shift in a direction that will make them more able to bear negative experiences later on.

In addition, one of the major research findings is that the simplifying model is most powerful when textual or oral presentations are accompanied by **visuals**. As such, we also provide a visual representation of the model here and throughout the report. These visuals are important in drawing out the power of this simplifying model.



More specific research findings include:

1. Using the *Resilience Scale* makes the following points from the science “thinkable” for members of the public:

- There are many factors that influence development that include, but aren't limited to, parents and personality.
- Environments, contexts, and communities provide key conditions and resources that shape developmental outcomes.
- Individuals have different genetic “starting points,” which are important in understanding developmental outcomes.
- The effect of contextual factors is mediated by these genetic starting points, but the starting points are not fixed — they are pushed and pulled by experiences over time.

- Individual differences are the product of 1) genetic starting points, 2) positions to which environments and experiences push these points, and 3) risk and protective factors.
- The “pile up” of risk factors is dangerous for all children.
- Resilience is the phenomenon in which positive outcomes occur despite the presence of significant negative factors.
- Developmental outcomes can be addressed and improved through multiple intervention strategies.
- The *Resilience Scale* is effective at channeling thinking away from the following highly accessible ways of thinking⁴ that threaten to impede public understandings of science messages:
 - *The “willpower” cultural model*, which is the implicit assumption that internal willpower is the exclusive determinant of positive outcomes.
 - *The “family bubble” cultural model*, which is the narrow focus on family and parents in understanding developmental outcomes.
 - *The “stress does the body good” cultural model*, which is the assumption that stress is a positive factor in development, and thus the only way to experience positive outcomes is to be exposed to significant stress.
 - *The “damage done is damage done” cultural model*, or the idea that once development is derailed, it cannot be put back on track.
- The *Resilience Scale* was highly communicable, moving easily among participants with a high degree of fidelity. Furthermore, when some breakdown in the metaphor did occur, as can be expected with any message, its underlying constructs (a scale with a sliding fulcrum) had sufficient internal coherence to snap back to its intended form and function.
- Recommendations for how to effectively deploy the simplifying model include:
 - Talk about scales being in contexts.
 - Assign agency to these contexts in filling the spaces on either side of the scale arm with factors that shape developmental outcomes.
 - Acknowledge that not all factors that can go on the scale weigh the same — some influences upset the scale arm more than others.
 - Explain how every scale starts with its fulcrum in some position; compare this starting point to a child’s genetic endowment.
 - Point to the fact that these starting points, which differ among children, shape how any given scale responds to weight.
 - Describe the fulcrum as a “sliding set point,” but one that is not equally shiftable across the lifespan.
 - Use visuals to allow audiences to engage with the physics of the scale.
 - Explain that policies have the power to take things on and off the scale, and to adjust the fulcrum over time.

WHAT IS A SIMPLIFYING MODEL?

A simplifying model is an explanatory metaphor that presents a concept in a way that the public can readily use to make sense of new information, productively channeling the way people think and talk about a particular topic. By pulling out salient features of a concept or problem and mapping onto them the features of concrete, immediate, everyday objects, events, or processes; the simplifying model helps people organize information into a clear picture in their heads. These tools, therefore, have the potential to make people more informed and better critical thinkers in evaluating solutions to social problems.

An effective simplifying model:⁵

- 1 improves understanding of how a given phenomenon works;
- 2 creates more robust, detailed and coherent discussions of a given target concept;
- 3 is applied in thinking about how to solve or improve a situation;
- 4 inoculates against unproductive patterns of thinking;
- 5 is communicable, spreading easily among individuals without major breakdowns or mutations;
- 6 can be used by people to narrate aspects of their and others' lives; and finally,
- 7 self-corrects, such that when a breakdown does occur, people can re-deploy the model in its original form, where it is able once again to clarify key aspects of the issue.

What a Simplifying Model on Resilience Needs to Achieve

Based on results of earlier qualitative research, we conceived the following instrumental goals for a simplifying model on resilience.⁶ The model must:

- **Communicate the role of gene-environment interaction in shaping individual differences and developmental outcomes.** The simplifying model should facilitate an understanding of development in which the range of environmental factors that directly influence outcomes are also mediated by genetic and biological factors.
- **Establish that resilience is an outcome rather than a substance or trait.** More specifically, it should enable people to understand resilience as a positive outcome in the face of significant adversity, rather than as a synonym for willpower.
- **Shift thinking away from “positive outcomes in the face of significant adversity are the norm and easy to achieve” to “positive outcomes are exceptional and facilitated by contextual factors.”** Because stories of bootstrapped success are so popular in American culture, people think such outcomes occur frequently, but the reality is different.

- **Inoculate against the notion that resilient outcomes are the exclusive result of innate willpower.** Crucially, the simplifying model should shift people away from explaining resilience as the result of personal willpower and internal innate drive, toward a focus on *both* the power of contextual and genetic factors.
- **Structure the realization that resilience has limits.** While there are cases in which positive outcomes occur in the face of significant adversity, there are limits to this equation; resilient is not synonymous with “invincible.” The simplifying model should reorient people to appreciate this point.
- **Allow people to see that resilient outcomes can be cultivated.** The model should help people see that improving outcomes, even in the presence of risk factors, is possible. Moreover, it should help people see there are multiple strategies for doing this.

Below, we briefly discuss the process by which FrameWorks’ researchers identified, developed and empirically tested the *Resilience Scale* simplifying model against a wide range of other candidate metaphors. We then discuss how people’s talking and thinking about developmental outcomes, individual differences, and resilience were affected by exposure to the model, and conclude with specific recommendations about how best to deploy this communications device. Appendix B provides more details about the research and analytical methods that were employed.

Why We Test Simplifying Models

Most people can easily identify, and even generate, novel metaphors to explain, teach, or argue points and ideas. Yet, metaphor shapes human cognition at deep and foundational levels that evade conscious detection and reflection.⁷ A metaphor proposes a re-categorization of a concept in mind, and because concepts exist in internalized webs of other meanings and implicit connections; metaphors frequently activate unintended, culture-specific concepts, and default cognitive preferences. These unintended effects may endanger the very communications goals that a metaphor was employed to achieve. Therefore, the only way to assure that a metaphor will work the way that its user intends is to preflight it for effect. FrameWorks, therefore, designs metaphor tests to observe and measure the *actual* directions that simplifying models take in social interaction and discourse. These tests allow us to “see around the first bend” — to observe what happens to metaphors as they live and breathe in complex cognitive, cultural, political, and linguistic ecologies.

How Simplifying Models are Identified and Tested

Phase 1: Mapping the Gaps

FrameWorks' research team first conducted Cultural Models Interviews and Expert Interviews. Cultural Models Interviews are designed to gather data from members of the general public that, through qualitative analysis, reveal the underlying patterns of assumptions — or cultural models — that members of the public apply in processing information on a given topic. Expert Interviews are designed to elicit the expert understanding of the issue and, as such, are conducted with researchers, advocates, and practitioners who possess an “expert” or technical understanding of the given phenomenon. Comparing the data gathered from these two types of interviews reveals the gaps that exist between how experts and average Americans understand and approach issues.

Phase 2: Designing Simplifying Models

Using approaches to metaphor from cognitive linguistics and psycholinguistics, FrameWorks' research team then analyzed transcripts of the interviews conducted in Phase 1 to generate a list of metaphor categories that captured salient elements of the expert understanding in metaphors accessible to the general public. The result of the design process was a list of metaphor categories and more specific instantiations (simplifying models) from each category.

Phase 3: Testing Simplifying Models

Candidate simplifying models were then tested in multiple research formats, beginning with On-the-Street Interviews with 60 individuals. These were followed by an experimental survey given to a sample of approximately 1,500 respondents; this survey tested the candidate models on measures of issue understanding and metaphor application. Finally, we took the most effective simplifying model candidates into multiple Persistence Trials, a qualitative method that mimics the game of telephone. This final method was used to see how well the most effective simplifying models held up in social interaction as they were used and shared. At each stage, we used our findings to winnow selections, as well as refine the simplifying models that remained. This resulted in a detailed understanding about which simplifying model worked and why.

The Winner: An Effective Simplifying Model for Resilience

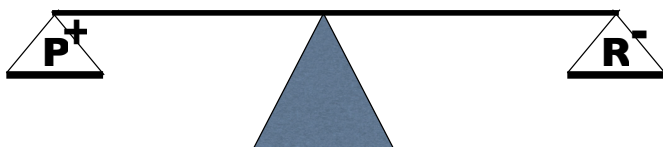
Employing the research process outlined above, FrameWorks identified, tested, and refined five broad simplifying model categories and a total of 13 more-specific iterations across those categories. One of these simplifying models, the *Resilience Scale*, emerged as effective in creating more scientifically-consonant and policy-productive understandings of

developmental outcomes, individual differences, and resilience. Below, we discuss what the use of this simplifying model offers to those translating the science of early child development to policymakers and members of the general public.

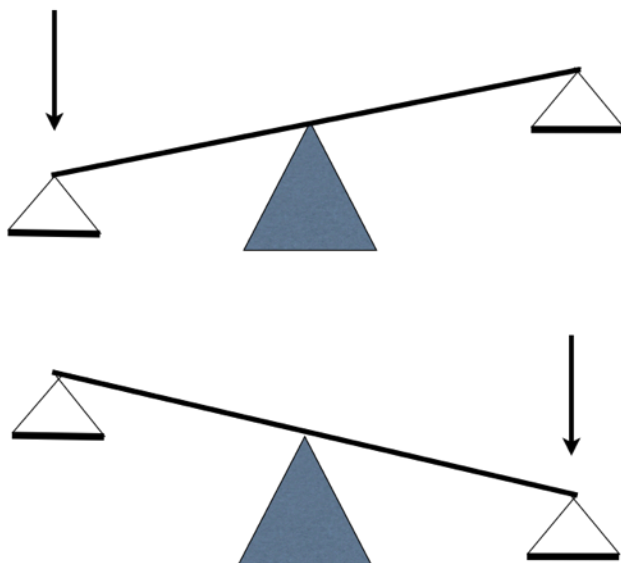
What The Resilience Scale Contributes to the Public Understanding

The strengths of the simplifying model come mainly from deeply modeled associations with “scales.” As these associations were frequently described through visual means, we provide diagrams to illustrate these productive associations.

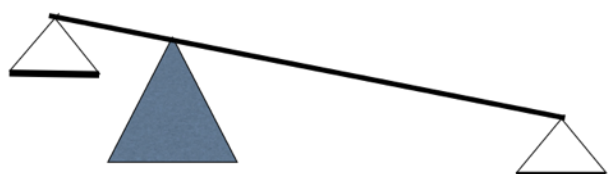
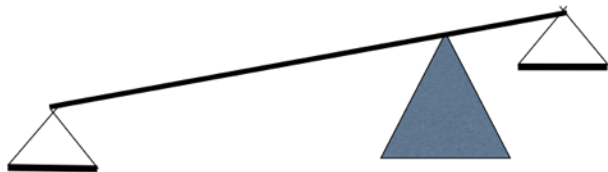
- Scales have two sides, on which positive and negative factors are stacked.



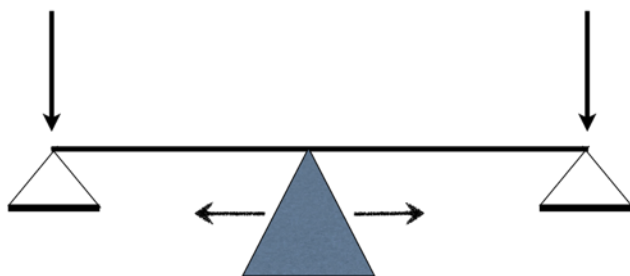
- The factors that are placed on the scale arm determine how it will tip.



- The location of the balance point, or fulcrum, influences the effect of placing weight on either end.



- Scales are dynamic mechanisms that respond to influences.
- Scales can be manipulated to achieve different inclinations. Things can be put on or taken off either side and the fulcrum can be moved to achieve a desired result.



Below we discuss the effects of the simplifying model and describe the specific strategic advantages it confers when employed in communications about early child development and resilience. We then provide recommendations for how to optimally deploy the model, and how it might be used in conjunction with existing parts of the Core Story of Early Child Development.⁸

I. General Effects

Research confirmed that the following were salient parts of the *Resilience Scale* simplifying model:

- The child's development is the scale.
- The tipping of the scale represents the outcomes of development.

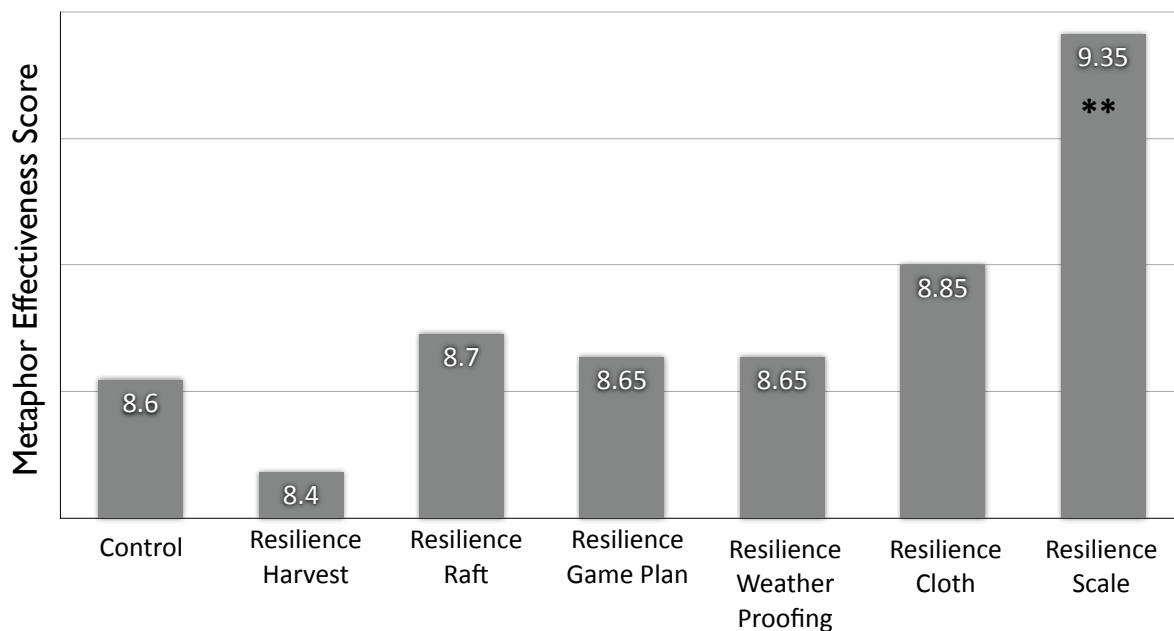
- Positive/protective factors get placed on one side of the scale, while negative/risk factors are stacked on the other.
- Protective and risk factors come in different weights, which means that the inclination of the scale arm is not simply a result of counting and comparing the number of factors on each side.
- The fulcrum represents an individual's genetic constitution.
- Each scale has a fulcrum, which starts in some position along the scale's arm.
- The positioning of the fulcrum determines the operation of the scale, which shapes its sensitivity to positive and negative weight.
- While every fulcrum starts in some place along the scale, experiences over time can cause the fulcrum to move, within certain parameters, in either direction; thus changing the scale's sensitivity to weight and predisposition to tip in one direction or the other.
- While the fulcrum remains somewhat slidable, there are times during which it is easier to move in either direction.
- Weight can be added to or taken off either side to shape outcomes.

II. Evidence and Effects

Using data gathered from a set of 60 On-the-Street Interviews to winnow, refine, and build out new candidate simplifying models, FrameWorks designed an online experimental survey that was administered to 1,500 Americans. The experiment was designed to assess the efficacy of six promising emerging candidates. This test, a head-to-head comparison using random assignment and a control condition (a science explanation without metaphor), allowed FrameWorks' researchers to chart the effectiveness of each simplifying model in achieving the instrumental goals described above.

The experiment was designed to measure the ability of the metaphors to yield explanations of individual differences, definitions and causal understandings of resilience, and solutions that are in line with those advocated by experts.

These outcomes were measured using a set of 12 multiple-choice questions which were scored and collapsed into a measure of metaphor effectiveness. Below are the results of the experiment.



The *Resilience Scale* emerged as the most effective model — achieving strong measures of statistical ($P < .001$) significance compared to the control condition as well as all the other candidate models.

Based on these experimental results, FrameWorks researchers ran six Persistence Trials with a total of 64 participants to explore the effectiveness of the *Resilience Scale*. The specific advantages of the *Resilience Scale* simplifying model that emerged from analysis of the Persistence Trials are as follows:

1. Application. Persistence Trials showed that *Resilience Scale* structured the following patterns in thinking and talking:

Environments, contexts, and communities provide conditions and resources that shape developmental outcomes. Informants using the simplifying model focused on the idea that *environments and communities* put things on either side of the scale arm that influence its incline and the development of a child (or children). The ease by which participants focused on contextual influences, rather than on willpower or more narrow notions of context (e.g., parents), is a major utility of the model.

Development is influenced by many factors. Earlier descriptive research⁹ showed that many people possess a narrow default understanding of the factors that influence developmental outcomes (parents, willpower, and genes). When primed with the *Resilience Scale*, participants described a dramatically expanded set of factors, such as community

resources, non-parental relationships, violence, educational quality, and availability of quality childcare. The *Resilience Scale* appeared to alter people’s analytical mode by providing additional open structure to which participants felt the need to assign influences. The result was to push them past their top-of-mind associations into a more exhaustive generation of all the factors that might go onto either side of the scale. Placing factors on the scale also led participants to think actively and more expansively about *how* their placement would influence developmental outcomes. This was a consistent strength of the *Resilience Scale*.

Cues a positive recessive model documented in earlier research. On multiple occasions, discussions of the *Resilience Scale* focused on the benefits of positive activities for people who participate in them, because they are a protective factor that can counterbalance negative experiences. This idea of activity involvement as a protective factor was documented in earlier descriptive research; there, we hypothesized that its activation might be promising as a prescriptive strategy.¹⁰ Persistence Trials affirmed our suspicion. When this assumption was active, it structured people’s understandings in a way that was consonant with the science of resilience and its programmatic implications.

Individuals have different genetic “starting points.” When people understood how scales have fulcrums whose position can change, they were able to think and talk more easily about ideas of individual differences and their genetic sources. Working with the model, participants explained that individuals begin with different levels of responsiveness to contextual influences.

The effect of contextual factors is mediated by biology. One of the most useful effects of the *Resilience Scale* was the way that it led participants to bring together ideas of genes, environments, outcomes, and individual differences in highly productive ways. It led to explanations that genes mediate the influence of contexts and that this confluence explains individual differences in outcomes. The *Resilience Scale* was successful in helping participants generate answers to the question of “How two children could be exposed to the same things but experience different outcomes.” Without the aid of a reframing tool, people overwhelmingly default to a single answer — *willpower*.

Genetic starting points are not fixed — they are influenced by experiences over time. People were also able to work productively with the notion of an unfixed fulcrum, which appeared to inoculate against the dominant American cultural model of “genes as set in stone.” Participants were at once able to use the simplifying model to discuss how “everyone starts somewhere ... with strengths and weaknesses and things about themselves because of the hand they were dealt” *and* to discuss how these starting points could respond to a person’s experiences. Thus, a major strength of the simplifying model is how it holds *both* a

sense of genetically based individual difference *and* the dynamic change to genes over the lifespan.

Individual differences in outcomes are the product of 1) different genetic starting points, 2) different positions to which environments and experiences push these points, and 3) the weight applied by risk and protective factors. This strength follows from the previous one. Participants employing the *Resilience Scale* model generated multiple ways of explaining individual differences. Importantly, these explanations were dramatically more expansive than the default positions previously documented, and decidedly consonant with the science. At various points, participants explained that individual children could experience different outcomes as a direct result of different genetic starting points or different contextual loads. Explaining individual differences through the interaction between fulcrum positioning and weight on the scale achieves many of the instrumental goals of the model.

Learned skill is part of the fulcrum. In several instances, informants talked about a child's skills in dealing with adversity as an important "part of the fulcrum idea." Participants talked about self-esteem, "adaptability" and "coping" as skills a person could both be born with and develop over time as the result of positive and supportive experiences and relationships. Thus, the learned skills were compared to having a fulcrum in a position where the child's scale is more difficult to tip in the negative direction, or more able to bear negative weight and still remain tipped in a positive direction.

The danger of risk factor pile-up. Thinking from the perspective of dominant cultural models, individuals tend to reason that there is no challenge too daunting for a driven individual. The *Resilience Scale* provided some much-needed nuance to such perspectives. It did so by illuminating a limited ability, whether by a scale or a child, to withstand accumulated negative factors. Primed by the simplifying model, participants clearly thought that the more negative things that are stacked on the scale, the more likely it will be to tip negative and the harder it will be to counterbalance and tip positive. In this way, the *Resilience Scale* communicated an important point about the danger of multiple risk factors.

Resilience is the occurrence of positive outcomes despite negative factors. Employing the simplifying model, informants arrived at definitions of resilience that approximated those forwarded by scientists, which is that resilience is the occurrence of positive outcomes in the face of significant adversity and risk factors.

Outcomes can be addressed and improved. Informants also applied the *Resilience Scale* in thinking about and discussing the power of interventions. These work by putting weight (positive experiences) on the positive side or taking it off (reducing risk factors) on the negative side of the scale. This opens an important opportunity to discuss how communities, programs, and policies can be deployed to enhance resilient outcomes.

The complex physics of the scale-fulcrum system represents multiple ways of improving outcomes. Another highly productive application of the simplifying model was the way informants talked at length about how there “are a lot of different ways of counterbalancing the scale.” Protective factors can be added to the positive side, risk factors can be removed from the negative side, and experiences can be provided that shift the fulcrum over time so as to make the scale more able to bear negative weight. This enhanced their sense of agency over a situation that can easily take a deterministic direction.

2. Inoculation. The *Resilience Scale* also showed the ability to inoculate against a set of powerful default cultural models about developmental outcomes, individual differences, and resilience that lead in unproductive directions. By “inoculation,” we mean that after exposure to the simplifying model, instances in which unproductive dominant cultural models could be seen shaping discussion were either non-existent or highly infrequent compared to instances in which individuals were not primed with a simplifying model.

Against the “willpower” model. FrameWorks’ descriptive research showed that willpower is a highly operative and dominant way of thinking about outcomes in general (why do children end up the way they do?), and resilience more specifically (how is it that some children end up doing well despite significant adversity?). However, discussions following exposure to the *Resilience Scale* were more balanced with respect to explanations and causal factors. Primed by the simplifying model, participants focused overwhelmingly on materialist (resources, relationships, contexts), rather than mentalist (drive, willpower), factors. They also emphasized the role of outside/community influences in shaping outcomes. This does not mean that mentions of willpower were non-existent, but that people invoked them as factors in more balanced senses. Analysis suggested an explanation: Because (most) people understand scales as things that you put multiple “things” on, assigning an exclusive role to willpower leaves parts of the system conspicuously unoccupied. Thus, developmental outcomes come to be understood as shaped by multiple factors. In one case, a participant began to take the group conversation down the willpower route, then looked back at a drawing of the scale and proceeded to explain how motivation “actually comes from the things around you.” This seemed to reflect the sense that even willpower is neither internal nor innate, but structured by external exposures and experiences.

Against the “family bubble” model. This same need to occupy parts of the scale pushes people outside family bubble modes of thinking. Outside a singular focus on the family, the scale forces people to consider the other factors that influence children and their families.

Against the “stress does the body good” model. FrameWorks research has shown that people who are unarmed with a reframing tool attribute a positive role to stress in the developmental process — a “what doesn’t kill you makes you stronger” Nietzsche-ism. Because of this,

Americans have trouble recognizing that frequent stress and the physiological responses to it damage the biology of the developing brain. The research described here demonstrates the existence of this same cultural model,¹¹ but also revealed the power of the *Resilience Scale* to provide nuance to this cultural gloss. In one such instance, a participant evoked the “stress does the body good” cultural model to explain how negative influences (in this case, exposure to violence and poverty) *produce* resilient outcomes. At this point, her Persistence Trial partner pointed to the scale and used it to argue against this assertion, explaining, “Well, wait a minute ... if we put stress on the negative side of the scale — like poverty — how can we say that it’s good?... If it’s bad enough or [there’s] a lot [of] it, it will tip the scale negative ... You see?”

Against the “anyone can do well regardless of context” model. Using both the stress and willpower models described above, Americans often reason that resilience is the *norm* rather than the *exception*, that anyone can (and should) pull themselves out of adversity with willpower and, furthermore, that such circumstances are valuable opportunities to build strength. The *Resilience Scale* inoculated against this line of reasoning by problematizing the bootstrap logic. Using the *Resilience Scale* to think about outcomes, participants explained that, most of the time, “If you’re born into crappy circumstances, you won’t end up doing well ... if your scale is stacked with a lot of bad stuff, in the majority of cases, you’re going to have problems.” In this way, the *Resilience Scale* helped people see that positive outcomes in the face of significant adversity are not the norm from which deviations are explained by a lack of true grit, but rather an exception.

Against the “damage done is damage done” cultural model. Shown to be highly dominant in previous frameworks research¹², the “damage done is damage done” cultural model was absent from conversations primed by the *Resilience Scale*. Instead, participants considered that outcomes can change over time, which is an available, but more recessive, way of thinking about development. The *Resilience Scale* appeared to harness this more productive model of development in two ways. First, participants understood that the incline of the scale’s arm is established and reestablished, echoing the dynamism of people’s concept of “scale.” Informants talked about how things come on and go off either side of the *Resilience Scale*, which shapes and explains outcomes at any moment in time. This fluidity inoculated against damaging senses of determinism. Second, participants could work with the idea that the fulcrum can slide in either direction from its starting point as a function of experiences over time. They also seemed able to work with the idea that the fulcrum moves relatively more easily in response to experiences in some moments rather than others, when the fulcrum becomes more inert, opening up space to discuss critical and sensitive periods. These dynamic entailments appeared to inoculate against determinism.

Against the “percentages of influence” model. By providing an interactive way for participants to think about the way that environments and genes influence outcomes, the

Resilience Scale pushed the dominant way of understanding this relationship — that outcomes are the aggregate of discrete factors — into the background. As described in the application section, the notion of outcomes being determined by the weight on the scale mediated by the position of a sliding fulcrum structured a more nuanced perspective, and supplanted the notion of separate parallel influences of genes and environments.

3. Self-correction. Self-correction is a simplifying model’s ability to “snap back” to its initial form following a deterioration or mutation of the concept during discussion. It is important, when communicated in the public sphere, that simplifying models have sufficient internal coherence to recover from devolutions — to encourage people to arrive at key entailments despite partial or inaccurate communication of the model.

There were several instances where some aspect of the *Resilience Scale* dropped out during a Persistence Trial, which provided the opportunity to view its ability to self-correct. In one case, there was a misunderstanding about what went on the scale as it was passed from one participant to another. In this case, the participant taught the idea that different children get placed on the scale and that the scale is a way of comparing children to see which one has a better outcome. However, the recipient’s interpretation of the simplifying model self-corrected as she interpreted the child as the scale, the factors that influence the child’s outcomes as weights on the sides, and the entire simplifying model as a way of explaining outcomes of development. Interestingly, after the model self-corrected, the recipient was able to re-teach the model back to the participant who had first taught it; who was then able to work productively with the corrected idea.

4. Communicability. Communicability refers to the faithfulness of the transmission of the simplifying model among participants. In this way, communicability and self-correction are somewhat antithetical concepts — were the metaphor perfectly communicable, it would not devolve and require self-correction. But a perfectly communicable simplifying model is an unrealistic expectation and, as communicability varies significantly between the metaphors that we test, it is an important metric of metaphor effectiveness.

The *Resilience Scale* was highly communicable; the central concepts were sticky and cued with very little effort and even when in partial form. Furthermore, important dimensions and applications of the model (discussed above in the Application section) persisted as it was passed between participants.

5. Body language and visuals. One of the most important findings from this research is the highly visual and embodied nature of the *Resilience Scale* simplifying model. Analysis showed how important drawings and gestures were to people’s use of the simplifying model as a way to think about and explain developmental outcomes, individual

differences, and resilience to others. It was clear that much of the simplifying model’s explanatory power derives from being able to see, experience and work with the physics of the scale. We conclude that this simplifying model draws as much, if not more, from visual and kinesthetic signifiers of the source domain (scales) as from linguistic signifiers. This finding plays prominently into the recommendations in the next section.

USING THE RESILIENCE SCALE

Our research shows that the *Resilience Scale* simplifying model is a powerful communications device in translating the science of early child development. More specifically, we have found that it is valuable in expanding public understanding of developmental outcomes, individual differences, gene-environment interaction, and the concept of resilience. The metaphor is highly understandable, applicable, communicable, and effective in inoculating against dominant cultural models that limit or misdirect public understanding on these issues.

We add several notes regarding the application of simplifying models in general and of the *Resilience Scale* more specifically. First, the simplifying model suggested here was tested both for its underlying concepts and with respect to the highly targeted linguistic execution of those concepts. Therefore, the emerging simplifying model represents both an effective metaphor and an effective linguistic delivery of that metaphor.

Below, we provide the following tools to assist users of this simplifying model as they create messages and applications using this tool.

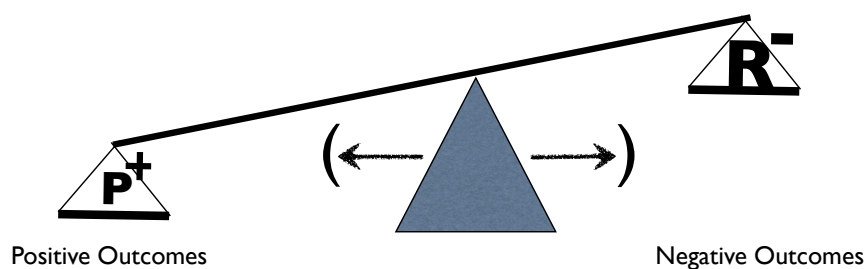
1. A list of the core points that represent the “essence” of the simplifying model.
2. Three iterations or manifestations of the metaphor, one visual (2a) and two textual (2b and 2c).
3. A general set of guidelines that users of the model may find helpful in creating effective communications.

1. A list of the core points of the simplifying model:

- You can think of a child’s life as a scale, and the things stacked on either side shape that child’s development.
- Scales have two sides onto which factors are stacked.
- The factors placed on either side determine how the scale tips, but factors don’t all weigh the same.
- We want children to have scales that tip positive.

- There's also a fulcrum point that determines the effect of placing weight on either side — shaping how easily the arm of the scale tips in either direction.
- Children are born with a fulcrum point in a certain place, and its early position matters a lot, but it can also shift over time.
- Resilience is having a scale that's tipped positive even with a lot of things stacked on the negative side.
- Scales can be counterbalanced and calibrated so as to achieve different inclinations.

2a. A visual presentation of the simplifying model



2b. Example textual presentation (shorter)

Each child is born with a certain level of sensitivity to experiences, which determines how well they turn out. This sensitivity is like the fulcrum of a scale that determines how much positive weight you need to pile on one side in order to counterbalance any negative factors on the other. You can achieve this counterbalance by piling on positive factors, and by moving the fulcrum by teaching the child skills, like coping skills or adaptive strategies. In our communities, we have to create programs for children who are very sensitive to their environments and who happen to be experiencing a lot of negative factors — they are the ones whose scales will take the most to counterbalance.

2c. Example textual presentation (longer)

It's useful to think about how the factors a child is exposed to affect how well they turn out, and communities play a big role in that. Think of a child's well-being as a sort of scale (or a teeter-totter), one end of which can get loaded with positive things, the other end of which can get loaded with negative things. We're talking about things like supportive relationships with adults on the positive side and extended exposure to stress (abuse, violence) on the other. We want the scale to tip to the positive side, so we need to make sure that its positive side is loaded up, and, if we can, unload some of the negative

factors off the negative side. And we might also think about where the fulcrum of the scale is positioned — is it making the scale harder to tip towards positive outcomes, or easier? It turns out that we can slide that fulcrum in either direction, say by teaching children coping skills or making sure that they stay physically healthy. And the earlier we start trying to move that fulcrum, the easier it will be. These are some of the things we have to do to make the scale tip to the positive side even when a child may experience negative weight from risk factors.

This idea could be presented in multiple other ways. For guidance in how to do that, consider the following recommendations:

- **Talk about scales being in contexts, and present bins on either end of the scale arm that people must fill.** Discussions were most productive when participants conceptualized the scale as being situated in a community, and where the community was seen as the source of protective and risk factors that fill the spaces on either side of the scale. We recommend that users talk about the scale sitting in a community and that the community be the agent responsible for stacking (and un-stacking) factors on the scale. Building up communities as meaningful agents can effectively counteract the potential to ascribe to children the responsibility for managing their own scale. It also sets an opening to present policies and programs as effective solutions.
- **Be explicit about what is what.** Research suggested that when assignments are not explicitly made between the source (i.e., the scale) and the target domains (i.e., developmental outcomes, individual differences, resilience) an opening is left for dominant cultural models to insert themselves, generating for example, interpretations that the fulcrum “is willpower.” This suggests the need for communicators to be explicit that: 1) the scale is the child; 2) positive factors go on one side and negative factors on the other; 3) the place where the fulcrum starts is a child’s genetic constitution (which can shift from side to side over time); and 4) the way the scale tips is the developmental outcome.
- **Use naturally occurring language around “stacking” and “accumulation.”** In using the *Resilience Scale* to explain outcomes, participants frequently talked about “stacking” factors. This language appeared helpful in clarifying the effect of multiple risk and protective factors. Stacks of risk factors reinforced the notion that there was some weight against which the scale, regardless of the positioning of its fulcrum, could not be counterbalanced; while talking about stacks of positive factors led participant conversations to notions of the protective effect of such accumulation.
- **Explain how all factors are not of equal weight.** During the design phase, there was some concern that the metaphor might set up a way of thinking that assigns all experiences equal weight and in so doing create the idea that understanding

- developmental outcomes is just about *counting and numerically comparing* positive and negative influences. The research revealed two ways of safeguarding against this potential interpretation: 1) use the fulcrum to build-in the nuance of individual variability in sensitivity to context and 2) explicitly discuss the fact that not all factors that go on the scale are of equal weight.
- **Explain that every scale starts with its fulcrum in some position and compare this starting point to a child’s genes.**
 - **Explain that these starting points shape how the scale responds to the weights added to the arm.**
 - **The Scale needs the fulcrum.** We found that presentations of the scale model that included an explanation of the fulcrum were stickier than if the dynamic scale arm was presented alone.
 - **Describe the fulcrum as a sliding set point.** Discuss the fact that fulcrums can move based on experiences and exposures over time, and that each shift in the fulcrum changes how the scale supports and reacts when weight is added or taken off its sides.
 - **Discuss how the fulcrum is not equally shiftable across the lifespan,** but that, rather, there are periods of development when it is most apt to shift and slide in either direction.
 - **Use visuals and gestures to allow audiences to engage with the physics of the scale** and the effect of factor-stacking, and implications of the positioning and movement of the fulcrum. This is essential to take full advantage of the conceptual work of which the metaphor is capable.
 - **Make use of alternative representations of the basic scale mechanism.** Teeter-totters and seesaws can be used to give audiences alternative conceptual cues so that they can take the basics of these mechanisms and apply them to understanding the target domains of developmental outcomes, individual differences, gene-environment interactions, and resilience.
 - **Use words like “fluid” and “dynamic”** to cue the available and useful entailment about scales — that their balance and inclination are ongoing processes in relation to past and current weight and fulcrum positions. Our research suggests that it’s important to construct a fluid scale rather than one that “tips and that’s it.”
 - **Use phrases such as “counterbalancing the resilience scale” and “calibrating the resilience scale”** to shift into discussions of policies and solutions.
 - **Talk about how programs can take things on and off the scale** by shaping community environments and, over time, can shift the fulcrum in either direction.

Finally, to assist those wishing to use the *Resilience Scale* as part of the larger Core Story of Early Child Development¹³, we provide the following points, which emerged from research in which we asked participants to think about the *Resilience Scale* and three of the

foundational elements of the Core Story: *Brain Architecture*, *Toxic Stress*, and *Effectiveness Factors*.

- **Explain that *Toxic Stress* can cause the fulcrum to slide and make the scale more likely to be tipped by negative weight.** When asked to think about connections between the idea of *Toxic Stress* and the *Resilience Scale*, participants explained how *Toxic Stress* can slide the fulcrum and make the scale more difficult to tip in a positive direction. Thus, “You can put a lot of positive stuff on the scale and still not have it tip positive,” and “Just a little bit of negative stuff will tip it [negative].” Participants also explained that, over time, *Toxic Stress* can break the scale beyond repair. These findings suggest that there is potential in integrating these two elements of the Core Story.
- **Explain that the fulcrum is built over time as part of developing *Brain Architecture*.** When asked to think about connections between the simplifying model of *Brain Architecture* and the *Resilience Scale*, participants identified *Brain Architecture* as the scale’s fulcrum, and talked about how this key structure of the scale is “built over time.” They also noted the importance of early influences, both positive and negative. This suggests that communicators can synthesize the models by talking about how establishing solid brain architecture builds a fulcrum; this fulcrum is able to bear some negative load without incurring negative outcomes. Weak *Brain Architecture*, on the other hand, is part of what makes the *Resilience Scale* sensitive to negative weight, causing it to easily tip toward negative outcomes.
- **Effectiveness factors are heavy weights that go on the positive side of the scale; they can be used to counterbalance negative weight and create resilient outcomes.** When asked an open-ended question about how the idea of *Effectiveness Factors* might be related to the *Resilience Scale*, participants pointed to the positive side of the scale, explaining that *Effectiveness Factors* could be things that you put on the protective side of the scale to counterbalance negative weight either before negative weight is introduced (suggesting a prevention approach) or after it has already been introduced (suggesting a remedial approach). The ease of this connection points to productive synergies between these two elements, and a way of moving from discussions of intervention to outcomes and resilience more specifically.

¹ Quinn, N., & Holland, D. (1987). Culture and cognition. In D. Holland & N. Quinn (Eds.), *Cultural models in language and thought* (pp. 3-40). New York, NY: Cambridge University Press.

² For an overview, see <http://www.frameworksinstitute.org/ezone8.html> and www.frameworksinstitute.org/assets/files/PDF/framingpublicissuesfinal.pdf. For more on causal chains, see <http://www.frameworksinstitute.org/ezone31.html>. For more on tone, see <http://www.frameworksinstitute.org/ezone17.html>

³ FrameWorks Institute. (2009). *Framing early child development Message Brief*. Washington, DC: FrameWorks Institute.

⁴ Kendall-Taylor, N. (2011). “*Anyone can do it ... Wake up, rise up and get some gumption*”: *Mapping the gaps between expert and public understandings of resilience and developmental outcomes*. Washington, DC: FrameWorks Institute.

⁵ Kendall-Taylor, N. (2010). *An empirical simplifying models research process: Theory and method*. Washington, DC: FrameWorks Institute.

⁶ Kendall-Taylor, N. (2011). “*Anyone can do it ... Wake up, rise up and get some gumption*”: *Mapping the gaps between expert and public understandings of resilience and developmental outcomes*. Washington, DC: FrameWorks Institute.

⁷ Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.

⁸ FrameWorks Institute. (2009). *Framing early child development Message Brief*. Washington, DC: FrameWorks Institute.

⁹ Kendall-Taylor, N. (2011). “*Anyone can do it ... Wake up, rise up and get some gumption*”: *Mapping the gaps between expert and public understandings of resilience and developmental outcomes*. Washington, DC: FrameWorks Institute.

¹⁰ Ibid.

¹¹ There were several instances in which participants attempted to make the *Resilience Scale* fit in with their models of stress. These instances are particularly poignant examples of the power of these models in shaping understandings of developmental outcomes. At one point, a participant clearly working with the “stress does the body good” model reinterpreted the scale such that the child was on one side and the difficult circumstances were on the other. Using this interpretation, he explained “The more stress a child faces, the more they are lifted up,” and experience positive outcomes.

¹² Kendall-Taylor, N., & McCollum, C. (2009). *Determinism leavened by will power: The challenge of closing the gaps between the public and expert explanations of gene-environment interaction*. Washington, DC: FrameWorks Institute.

Kendall-Taylor, N. (2011). “*Anyone can do it ... Wake up, rise up and get some gumption*”: *Mapping the gaps between expert and public understandings of resilience and developmental outcomes*. Washington, DC: FrameWorks Institute.

¹³ FrameWorks Institute. (2009). *Framing early child development Message Brief*. Washington, DC: FrameWorks Institute.

APPENDIX A: THE SCIENCE ACCOUNT OF RESILIENCE

Positive Outcomes in the Face of Adversity

How does “it” work?

- Environments contain factors that either threaten or facilitate positive outcomes to various degrees.
- Environments vary in the degree to which they are invested with such factors.
- Environmental quality can be understood by comparing risk and protective factors.
- Individuals vary in susceptibility to environmental factors.
- That variability originates in the body’s genetic instructions, but early experiences shape whether, and how fully, genes are expressed.
- Experiences can adjust susceptibility by building competency.

What does it say about “resilience”?

- Resilience is a positive outcome in the face of adversity.
- Resilience is explained by each individual’s unique combination of low bio susceptibility, and experiences that facilitate compensational skills.
- There are three factors most strongly associated with resilience: IQ, temperament and supportive relationships.

What are the solutions?

- Better outcomes can be cultivated by promoting protective factors and reducing risk factors.
- Supportive relationships are a key protective factor.
- Skills can be cultivated that mitigate vulnerability to risk factors.

APPENDIX B: THE METHODOLOGICAL APPROACH TO IDENTIFYING AND TESTING SIMPLIFYING MODELS

I. PHASE 1: MAPPING THE GAPS

In the first phase of this simplifying models research process, FrameWorks employed an interview method called Cultural Models Interviewing. Using a detailed interview guide, interviewers asked questions aimed at getting at how average Americans understand developmental outcomes, individual differences and resilience.

More generally, Cultural Models Interviews reveal the cognitive “terrain” on a given issue by focusing on the implicit patterns of assumptions — or cultural models — which individuals employ to process incoming information on an issue. These patterns are the “mental bins” into which people try to fit incoming information, and represent both potentially productive and damaging ways of making sense of information. To uncover the gaps in understanding on the target issue, the findings from Cultural Models Interviews were held up to data gathered from experts in the area of resilience. FrameWorks calls this process “mapping the gaps.”

II. PHASE 2: DESIGNING SIMPLIFYING MODELS

After identifying the gaps in understanding, the second phase of the simplifying models research process aimed to generate a set of candidate simplifying models that were then empirically explored and tested in the third research phase. The result of the design process was a list of both metaphorical categories (e.g., “*Species*” and “*Resistance*”), and multiple iterations or “executions” of each category (e.g., “*Dandelions and Orchids*,” “*Weatherproofing*”). FrameWorks’ linguist analyzes all of the transcripts from the “mapping the gaps” phase of the research process, and then generates a list of metaphor categories that represent existing conceptual understandings that can be recruited, and metaphorical language and concepts that the experts and general public share. The linguist generates metaphor categories that capture the *process* element (how the thing works) of the expert understanding in metaphors that, given the data gathered from the general public, have the potential to be easily visualized and incorporated into thinking about the issue under consideration.

FrameWorks researchers who are specialized in cultural models and cognitive theory conduct a cognitive analysis of the model categories, which examines the *expected* public response to the metaphors based on cultural models theory and existing FrameWorks research on cultural models that Americans employ in understanding an issue (in this case, early child development and other related areas, such as mental health and learning). Researchers then use this analysis to review the metaphor categories, adding new possibilities and suggesting ones to be cut. At this stage, researchers also compare the candidate metaphors to the data from the initial Cultural Models Interviews. Metaphor categories that contain elements or

aspects of models found to be damaging or distracting in the public's thinking about the topic are eliminated from the candidate list. On the other hand, simplifying model categories containing elements of more productive cultural models are highlighted as particularly promising.

During the process of designing candidate simplifying models, FrameWorks also assesses the models' abilities to be incorporated into practice by journalists and advocates/practitioners. In some cases, this practical assessment has suggested that some candidate models are too provocative or problematic to pass into the public discourse. These models are removed from the working list. The refined list is then returned to the linguist, who begins to compose iterations or executions of the categories on the list. The list of categories and iterations is sent back to FrameWorks researchers for additional revisions.

III. PHASE 3: TESTING SIMPLIFYING MODELS — THREE TESTS OF MODEL EFFECTIVENESS

TEST I: ON-THE-STREET INTERVIEWS

As the initial opportunity to test candidate simplifying models, On-the-Street Interviews present an ideal opportunity to gather empirical data on the effectiveness of candidate simplifying models: which specific elements of the models are functioning well, and which aspects are less successful in clarifying concepts and shifting perspectives.

The metaphors are written up as “iterations,” paragraph-long presentations that cue the listener/reader to two domains of meaning, one that is typically referred to as the “source,” the other as the “target.” In the metaphorical statement “encyclopedias are goldmines of information,” the source domain of meaning is “goldmine” and the target is “encyclopedias.” In FrameWorks' terms, “encyclopedias” is the target because it is the object or process that the application of knowledge about goldmines is meant to illuminate.

Iterations on the following metaphors were brought to this stage: *Harvest*, *Corner Store*, *Swimming Pool*, *Cattle Drive*, *Water Resistance*, *Weatherproofing*, *Animal Species*, *Plant Species* and *Season Play*.

In late 2011, FrameWorks tested a total of ten candidate simplifying models in Boston, Mass., and Cleveland, Ohio. Each candidate model was presented orally, in separate interviews, to three informants in each location, for a total of six interviews per model, comprising a data set of 60 ten-minute interviews. All informants signed written consent and release forms, and interviews were video- and audio-recorded by a professional videographer. The 10 models represented executions of five different candidate simplifying

model categories. Data from the interviews were used to winnow and refine categories, as well as to refine the individual executions of metaphors within categories.

Subjects

A total of 60 informants were recruited on-site in the two locations. A FrameWorks researcher approached individuals on the street or walking through a mall, and asked if they would be willing to participate in a short interview as a part a research project on “issues in the news.” The recruiting researcher paid particular attention to capturing variation in gender, ethnicity and age.

Data on each informant’s age and party affiliation, as self-identified, were collected after the interview. Efforts were made to recruit a broad range of informants. However, the sample is not meant to be nationally representative. Although we are not concerned with the particular nuances in how individuals of different groups respond to and work with the simplifying models tested in these interviews, we recognize the importance of between-group variation and take up this interest later on in quantitative testing of simplifying models. There, the virtues of quantitative sampling techniques can effectively and appropriately address issues of representativeness and across-group variation.

The Interview

FrameWorks had the following goals in designing and conducting On-the-Street Interviews: (1) identify particularly promising simplifying model categories; (2) refine those categories with more mixed results; and (3) eliminate highly problematic categories, in which the underlying *concept* created problems that could not be overcome by refining existing or designing new executions. FrameWorks’ approach to this winnowing process is highly conservative, to assure that only the most unproductive categories — those that are beyond repair — are eliminated.

However, winnowing is a necessary feature of a process that intentionally produces a large set of possible iterations, but culminates in the one most effective simplifying model. More specifically, interviews were designed to gather data that could be analyzed to answer the following questions.

A. Did the informants *understand* the model and its underlying metaphor?

B. Did they *apply* the model to talk about developmental outcomes, individual differences, gene-environment interaction and resilience, and were such applications productive in relation to the science on these issues?

C. Did the model *shift* discussions away from any unproductive dominant thought patterns that characterized the initial responses?

D. Did exposure to the model *lead to more articulate answers and robust, fully developed conversations* of issues that informants had problems discussing prior to being exposed to the model?

TEST II: QUANTITATIVE EXPERIMENTAL RESEARCH

After analyzing On-the-Street Interview data, FrameWorks subjected the refined set of simplifying models to an online quantitative experiment. The overarching goal of this experiment was to gather statistically meaningful data on the models' effectiveness, which provided an empirical basis for selecting one or two models that were most successful relative to a set of theoretically-driven outcome measures. In the end, experimental data were used to select and refine one model that was then taken into the final stage of the empirical testing process. The models that emerged as successful in On-the-Street Interviews were built out to include other iterations.

In early 2012, FrameWorks conducted the survey, which measured the performance of six candidate simplifying models in three metaphor categories in relation to a set of outcome measures. In addition, a control condition was tested in which the same science was explained but without a metaphor. Approximately 1,500 survey participants were drawn from a national online panel, and data were weighted on the basis of gender, age, race, education and party identification to ensure that the sample was nationally representative.

Experimental Design

Following exposure to one of seven “treatments” — paragraph-long iterations of candidate metaphors — participants answered a series of questions designed to measure a set of theoretically-based outcomes. Effects were compared both across and within categories, meaning that general categories were tested against other general categories, and specific iterations were tested against other iterations both within and across categories. Outcomes measured focused on metaphor *application* — or how exposure to the metaphor shaped the ways in which informants answered (i.e., thought about) questions about the target domains.

Treatments

In designing the survey instrument, multiple iterations were generated by a linguist as alternative representations of the larger metaphor categories. For example, the *Resistance* category included specific instantiations of *Cloth* and *Weather Resistance*, while *Surplus* contained *Harvest* and *Raft*.¹⁴

In total, six specific simplifying model iterations were developed (plus a control condition). Each treatment consisted of a paragraph that described the metaphor, as in the following example for *Harvest*.

The Resilience Harvest

Some say that children’s development goes well when it is cultivated, like a farm harvest. When positive outcomes happen despite pests or drought, we can say there’s a resilience harvest. Even facing adverse conditions, children can thrive if communities cultivate their resilience through access to supportive relationships, role models, and ways to cope. Resilience is a crop that must be grown and tended.

Among iterations, the only differences were the name of the model (e.g., *Harvest*), entailments, structural features specific to that metaphor, and appropriate lexical items or phrases. This balance of *variation* between models and *standardization* in construction and language is designed to ensure that any differences in effect were due to differences among the models themselves, and not to some unintended confounding variable.

Outcome Measures

After receiving the treatment paragraph, participants were asked a series of multiple-choice questions to test each model’s performance in relation to their understanding of outcomes and individual differences, definitions of resilience, causes of resilience and ways of improving resilience. The numerical outcomes of this experiment are provided in the main body of this report.

TEST III: PERSISTENCE TRIALS

After using quantitative data to select the most effective model, FrameWorks conducts Persistence Trials to answer two general research questions: (1) *can* and *do* participants transmit the model to other participants with a reasonable degree of fidelity, and (2) *how* do participants transmit the model? In other words, the method examines how well the simplifying models hold up when being “passed” between individuals, and how participants use and incorporate the models in explanation to other participants.

The Persistence Trial

As mentioned above, there were two types of Persistence Trials used on this project: Standard Persistence Trials, which are designed to look closely at how people use the model and get some idea of its communicability, and Rapid Fire Persistence Trials, which are designed to focus squarely on the communicability of the simplifying model.

A Standard Persistence Trial begins with two participants. The researcher presents one of the candidate simplifying models and asks the two participants a series of open-ended questions

designed to gauge their understanding of the simplifying model and their ability to apply the model in discussing the target domain (here, how effective learning might be improved). For example, the researcher asked how the participants understood the simplifying model; then probed how well they could use it to explain what learning is and what learners need, and what sorts of tools learners might need in order to learn more effectively. Questions and analysis were also designed to locate any terms or ideas in the execution of the model that participants had difficulty with, or explicitly recognized as problematic.

After 15 to 20 minutes of discussion between the two initial (Generation 1) participants and the interviewer, Generation 1 was informed that they would be teaching the simplifying model to another pair of participants (Generation 2). Generation 1 was given five minutes to design a way of presenting the simplifying model, after which they had five minutes to present it to Generation 2. Generation 2 then had five to 10 minutes to ask Generation 1 questions about the presentation. During this time the interviewer generally allowed dialogue to unfold naturally between the two groups but periodically probed for additional information on ideas that emerged.

Generation 1 then left the room and the interviewer asked Generation 2 an additional set of questions designed to elicit their understanding of the simplifying model and their ability to apply the concept. This questioning lasted for approximately 10 minutes, at which point Generation 2 was informed that they would be “teaching” the idea to two new participants (Generation 3). Generation 2 had five minutes to plan their presentation, after which Generation 3 entered the room and the two groups went through the same steps and questions as described above.

A Persistence Trial ends when Generation 1 returns to the room, where Generation 3 teaches the model to Generation 1 (without being told that Generation 1 is already familiar). The two groups are then allowed to debrief on the direction the metaphor has taken. The interviewer then reads the original paragraph-long iteration and asks questions about its transmissibility.

The second type, which we call a Rapid Fire Persistence Trial, focuses specifically on exploring the communicability of a given model — its ability to hold up across multiple transmissions between individuals. These sessions are sped-up versions of the standard method — designed to allow for multiple passes between individuals. In these sessions, the research presents the simplifying model to a single participant, asks the informant one or two questions, and then asks the participant to pass the model to another participant. This passing procedure is repeated four to six times over half an hour to constitute one rapid-fire cycle. Four of these half-hour cycles constitute one Rapid Fire Persistence Trial.

For the research discussed here, FrameWorks conducted four Standard Trials and two Rapid Fire Trials. Trials were conducted in Boston, Mass., and Philadelphia, Pa. All informants signed written consent and release forms prior to participating in the sessions, and interviews were video- and audio-recorded by professional videographers.

Subjects

A total of 64 informants participated in Persistence Trials. These individuals were recruited through a professional marketing firm, using a screening process developed by and employed in past FrameWorks research. Informants were selected to represent variation along the domains of ethnicity, gender, age, educational background and political ideology (as self-reported during the screening process).

Analysis

In analyzing data from Persistence Trials, FrameWorks sought to answer the following specific questions in relation to each simplifying model.

A. Were participants able to *apply* the simplifying model; and more specifically, what were the ways in which they applied the model?

B. Was the simplifying model *communicable*? Were the Generations' presentations of the simplifying model faithful to the initial model presented by the interviewer? How did the groups' presentations of the model differ from the interviewer's presentation (i.e., did they use different language, use different ideas related to the metaphor, emphasize different entailments, etc.)?

C. Did the simplifying model *inoculate* against dominant default cultural models? That is, did the model prevent discussions from falling back to the dominant unproductive cultural models? Furthermore, if one of these cultural models did become active, could the simplifying model prevent the discussion from veering narrowly in these perceptual directions?

D. Did the simplifying model *self-correct*? That is, if one Generation's presentation was not faithful to the original simplifying model or left out a key component, did the ensuing Generation's interpretation and/or presentation self-correct?

E. What specific *language* did the groups use in discussing the model? Was there language that participants used that was not included in the original execution of the simplifying model?

As described in the main body of this document, the *Resilience Scale* produced a number of beneficial effects on participants' talking about the target areas of developmental outcomes, individual differences, gene-environment interaction and resilience.

¹⁴ Titles of simplifying models go through many changes, though the paragraph-long iterations each title is attached to may not.