FrameWorks Institute | 1333 H Street NW Suite 700 West Washington, DC 20005
www.FrameWorksInstitute.org
@FrameWorksInst

Testing Usability:

The Use of Addiction Explanatory Metaphors in Framing Public and Professional Conversations

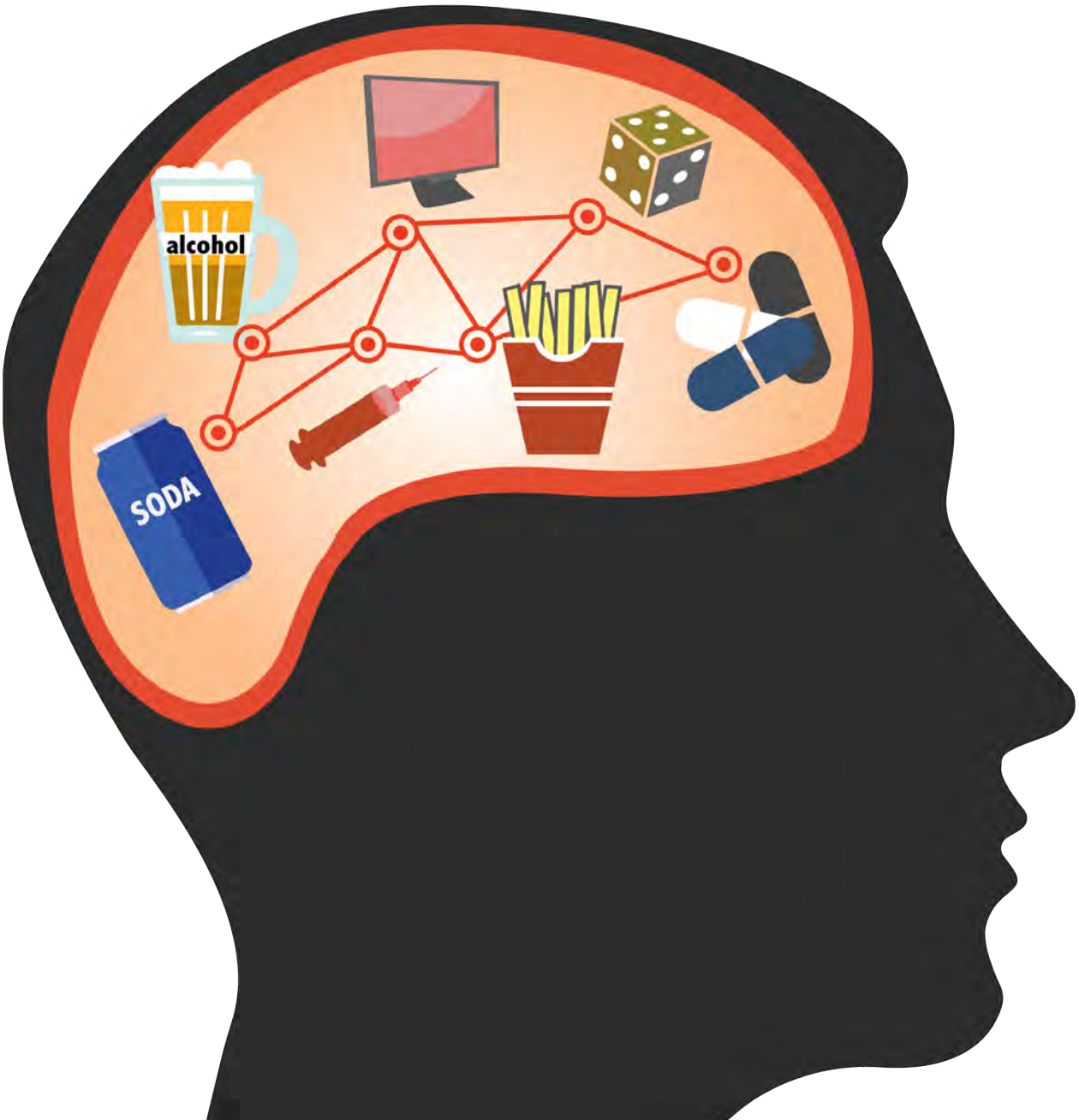

TABLE OF CONTENTS

INTRODUCTION

After an Explanatory Metaphor has passed successfully through a suite of rigorous empirical tests designed to determine whether and how it helps non-experts think about a particular concept, FrameWorks researchers subject the resulting metaphors to one final evaluation. In addition to exploring how the metaphor frames understanding of those receiving messages, this last test is designed to provide information on how the metaphor is used by experts in communicating knowledge — in this case, about addiction. This final empirical step — what are called "Usability Tests" — is vital in crafting Explanatory Metaphors that have the ability to seep into expert discourse and be used by experts in their work as translators and communicators. In short, these tests focus on understanding and optimizing the usability of the Explanatory Metaphors.

During a Usability Test, advocates, practitioners and experts who represent groups who might use the Explanatory Metaphor in their communicative practices are presented with the metaphor and asked to employ it in explaining their work. The goal of these tests is to observe how the metaphor is (and is not) usable. What sorts of questions does the metaphor help experts answer? Do experts discover helpful aspects of the metaphor not previously identified? Can the metaphor be illustrated (and, if so, how is it illustrated) or embodied through gesture? Do experts struggle to use the metaphor to explain particular concepts or make certain points? Usability Tests also allow FrameWorks researchers to debrief with experts about their experience using the metaphor. Did it give them the resources they needed to communicate their messages and explain key concepts? Do they have suggestions for modifying the metaphor to make it easier to use?

The findings and recommendations presented below are based on 10 Usability Tests conducted in Edmonton and Calgary in May 2014 to test three Explanatory Metaphors: *Redirecting the River*, *Reward Dial*, and *Resilience Scale*. These Usability Tests extend, in three key ways, a previous set of Usability Tests conducted on FrameWorks' suite of addiction metaphors with addiction researchers and clinicians at Yale University in September 2013.[1] First, the Usability Tests described here were conducted in Alberta and, therefore, provide the most relevant data available to date on the usability of these framing tools by practitioners, experts and other professionals in the province. Second, the current analysis provides results on the previously untested usability of a metaphor (*Resilience Scale*) for communicating how early experiences shape later outcomes such as addiction. The Usability Tests presented here explore, in particular, how this Explanatory Metaphor can serve as a "bridge" between the Early Child Development/Child Mental Health and Addiction narratives developed in earlier FrameWorks research. Finally, rather than focusing solely on expert-to-public communication, this analysis expands the types and

combinations of "presenters" and "audience members" to include general health practitioners. Health practitioners were selected for these Usability Tests because they represent ideal messengers for the science of addiction. If these practitioners are able to disseminate effective frames on addiction, both to their colleagues and clients, they can influence both the field's practices around addiction as well as the understandings of a wide range of members of the general public with whom they interact.

The basic architecture of a Usability Test is as follows: In a two-hour meeting, two experts are presented a metaphor by a FrameWorks researcher. The researcher first discusses the metaphor with the two experts, then leaves the room to let the experts work on a presentation using the metaphor. Two audience members (either members of the general public or a second pair of experts) are then brought in, and the first experts use the metaphor to present a concept. After this presentation, the audience members are encouraged to ask the presenting experts questions about their presentation and the experts are given the opportunity to address these questions. Finally, the audience members leave the session and the FrameWorks researcher conducts a structured debrief, asking the experts questions such as: How did you find using the metaphor? Was it easy to use? Was it difficult to use? What parts of it were difficult to convey or did not fit with the concept you were presenting? How would you change the metaphor to make it more useful?

For the present analysis, FrameWorks researchers conducted three different types of Usability Trials for each metaphor: one where addiction specialists used the metaphor in a presentation to members of the public, one where general health practitioners used the metaphor in a presentation to other general health practitioners, and one where general health practitioners used the metaphor in a presentation to members of the public.[2] This approach allowed FrameWorks researchers to explore whether the high levels of usability established in earlier research extend to health practitioners who are not necessarily experts in addiction. With participants' permission, all sessions were video recorded and transcribed for analysis. The findings and recommendations that follow emerged from analysis of data across the different types of interactions captured in each Usability Test (moderator-expert discussions, expert-expert discussions, expert presentations and — in the case of Usability Tests with non-expert audiences — expert-public discussions).

I. REDIRECTING THE RIVER

Experts were presented with a brief explanation of the *Redirecting the River* metaphor, and were then asked to create a presentation in which they used the metaphor to answer the following question: *What does good addiction treatment look like?*

Positive Effects

1. The metaphor enabled experts to make key points about the science of effective addiction treatment. Experts used the metaphor to make the following key points about addiction services, programs and treatment:

- *Addressing addiction requires a multi-modal approach.* Experts described how, just as redirecting or rechanneling a river requires the contributions of scientists, engineers, cartographers and others, effective addiction services involve the combined efforts of psychiatrists, therapists, family physicians and vocational counselors, as well as family and community members.

- *Addiction is most effectively addressed when services begin early in the trajectory of the addiction and is more difficult to address when treatment occurs later in this trajectory.* The idea that efforts to redirect a river are easier if they begin early — when the river and the path it runs are "shallow" and "forming" — was frequently employed by experts to explain that "redirecting" addictive behaviors is easier when treatment begins early in the trajectory of an addiction.

- *Treatment is both immediate and extended*. Experts employed the metaphor to talk about the different time frames involved in effective treatment — noting, for example, that there is immediate work that needs to be done to dam or divert the river in order to ensure immediate safety and survival, but long-term maintenance measures need to be in place to ensure that the new channels hold and that the river doesn't find its way back to its old groove or overflow its banks. Experts also described how the work of diverting a river "doesn't happen overnight," but, rather, requires a commitment of resources and support in order to yield positive outcomes. The ability to use the metaphor to communicate about the need for treatment that is both *immediate* and *extended* was one of the more frequently and effectively used entailments of the *River* metaphor.

- *Addiction services are complex.* Experts leveraged a productive sense of complexity that is embedded in the *River* metaphor. Just as diverting a river requires paying attention to the sources of the river's water, the grade of the land through which the river runs, and the availability of dry stream beds and channels to absorb overflow, treating and addressing addiction requires attention to the multiple sources that "feed" addictive behaviors.

- *Addressing addiction requires more than willpower.* The *River* metaphor was designed to "add back in" the contextual considerations that are often absent from Albertans' default understandings of addiction and addiction treatment.[3] Experts adeptly used the metaphor to discuss structural and contextual considerations, and to explain why addiction treatment is not solely a matter of motivation and individual agency.

- *Addressing addiction requires a menu of services with varying degrees of intensity.* Experts used the metaphor to describe how treatment should be matched to need. They explained that, just as the work required to divert a "small stream" is different than the work required to divert "the Mississippi," different trajectories of addiction require treatment at different levels of intensity.

2. Facilitated cross-professional conversations. Both addiction experts and general health practitioners used the metaphor to talk with each other about their own work by mapping their professional activities onto various parts of the metaphor. For example, participants who worked in public health and prevention research talked easily about the need to look at "upstream factors" that could affect the flow of the river, while addiction treatment clinicians talked about how efforts to redirect a river work best "when the river is low — not when it's at flood stage." All experts were able to recognize themselves as part of the interdisciplinary team that should be involved in effective addiction services. The applicability of the metaphor to a range of professional activities — and its usability by a range of health professionals with varying levels of expertise in addiction treatment specifically — is a major strength.

3. Highly salient. Experts in Usability Trials conducted in Calgary, in particular, consistently brought up the Calgary floods of 2013 after being presented with the *River* metaphor. Far from overwhelming the communicative goal of the metaphor, however, the salience of rivers, floods and redirection served to enhance the metaphor's usability. As one expert put it, "I can picture what it takes [to redirect a river]."

4. Sticky language. The metaphor proved persistent throughout expert presentations and discussion. Experts easily took up the language of the metaphor to talk about the "flow" of an addiction; the "groove" it creates and the difficulty of getting out of this groove; the need to "divert," "re-channel" and "redirect" someone from "moving" or "flowing" in "dangerous directions;" and the process by which a "small stream" can become a "raging river" in the absence of appropriate and early intervention. The language of addiction being "like a raging river" was particularly evocative and resonant for addiction experts and general health practitioners alike. In this sense, experts used the metaphor not just to talk about treatment, but to talk about the dynamic qualities of addiction and the ways in which addictive disorders develop and change over time based on environments and contexts.

5. The metaphor was used non-linguistically. Experts frequently relied on gesture to evoke the metaphor and its explanatory power. The degree to which the metaphor was "embodied" — that is, deeply incorporated and employed — is another measure of its high degree of usability.

6. The metaphor was used to tell stories about change. The *River* metaphor lends itself easily and powerfully to telling stories about the *course* of addiction.[4] For example, one addiction expert noted how early experimentation with substances could be compared to a trickling stream — but that, when work is not done upstream to ensure that the banks of the stream don't overflow, that little trickle can become a raging river. When used in this way, the stories that the metaphor structures remain focused on context and not on the individual and their personal characteristics, struggles and successes/failures. Earlier FrameWorks research on framing addiction in the province has found that this ability to structure thematic, rather than episodic, stories is key in successfully translating science perspectives on addiction and other related social issues.[5] The metaphor's ability to generate stories is likely due to its strong dynamic components: Things start in one way and then, as a result of some set of actions over time, come to be another.

Critiques and Suggested Changes

In addition to the high degree of usability discussed above, there were several critiques and challenges that emerged from Usability Trials. These were carefully considered, and changes were made to the final presentation of the metaphor (offered below) to address these concerns.

1. The enormity of the task. Some public audience members suggested that likening addiction to a river implies a certain level of inevitability — that is, it suggests that you can't "get rid of" an addiction just like you can't "get rid of" a river. *The final iteration of the metaphor was adjusted to better acknowledge the seriousness of the treatment task while*

simultaneously emphasizing its feasibility. We also consider this critique in our recommendations for how to use this metaphor.

2. What, exactly, is the river? There were several instances in which experts struggled to define what the river represented in the metaphor. In the absence of this critical understanding, they had difficulty applying the other aspects of the metaphor to talk about the characteristics of effective treatment. In one session, one general health practitioner presented the river as addiction *treatment* — generating some confusion on the part of her general health practitioner audience members. In another instance, the river was identified as the *person* with the addiction; experts quickly pointed out that this comparison yields problematic implications around "redirecting" and "diverting" *people*, rather than addictions*.* It is interesting to note, however, that in both cases experts eventually decided (without intervention from the moderator) that it made more sense to think of the river as the addiction process*. The final iteration of the metaphor was adjusted to clarify that the river represents the addiction process itself.*

3. Where is prevention? Several experts — particularly those who were general health practitioners — struggled initially to find a place for prevention in the metaphor, but were able to do so when given the opportunity to extend or elaborate the metaphor. For example, some experts talked about looking at factors "upstream" that affect the flow of the river, while others talked about building "diversion projects" that could prevent another "raging flood." These conversations were often prompted by associations with the Calgary floods. As one expert put it, "You can't prevent a river. But you can build in channels and dry creek beds — support systems — that prevent flooding." *Because the primary purpose of the metaphor is to convey the characteristics of effective addiction <u>treatment</u>, as opposed to prevention, we have not made substantive changes to the final metaphor iteration. However, we do offer recommendations for ways in which communicators might incorporate prevention activities into the metaphor, if they so choose.*

4. Redirecting vs. stopping. One expert felt it was important to further emphasize the distinction between redirecting and stopping. The goal of effective treatment should not be to "stop" sensations of pleasure, desire and reward, just as the goal of redirecting the river should not (and cannot) be to "stop the river." Rather, in both cases, the goal should be redirection towards healthier channels. *While no additional changes to the metaphor were made in response to this comment, we include this point in our recommendations for use below.*

5. Treatment vs. Services. Several experts suggested replacing the term addiction *treatment* with addiction *services*, noting that the latter encompassed a broader range of programs, interventions and activities that extend beyond clinical settings. *The final iteration of the metaphor uses the term "addiction services" rather than "addiction treatment."*

Recommendations for Use

Based on our findings regarding the positive effects of the *River* metaphor, and the potential challenges associated with its use, we offer the following recommendations for using the metaphor in communicating about addiction:

1. **Communicators should emphasize the following features of the source domain (rivers):**

    - Diverting a river is a significant endeavor and requires multiple types of expertise.
    - Redirecting a river is easier the earlier it is attempted.
    - Redirecting a river requires both immediate and extended, long-term work.
    - Redirecting a river requires an understanding of, and attention to, its sources.
    - Redirecting a river requires specific and concrete actions; motivation or intention alone is not enough.
    - Different rivers require different levels of intervention intensity in order to achieve redirection.

These components of the source domain should be applied to make the following points about addiction services:

- Effective services are multimodal.
- Services are most effective when they occur early in the trajectory of an addiction.
- Effective addiction services require immediate and sustained intervention and support.
- Effective addiction services must examine the multiple factors that cause and reinforce addictive behaviors.
- The level of service intensity should be matched to the trajectory of the addiction.

2. **Be mindful of the metaphor's connection to floods.** Communicators should recognize that for many people — particularly those in or near Calgary — the *River* metaphor will likely cue thinking about the recent floods. When appropriate, we encourage communicators to connect these understandings to the communicative goals of the metaphor. For example, experts might remind audiences that just as ongoing monitoring and maintenance is needed to prevent additional flooding, so too do good addiction services require a long-term commitment.

3. **Use gesture.** The use of gesture to accompany applications of the metaphor is highly recommended, as these gestures help illustrate and "set" aspects of the metaphor that increase its effectiveness as a translation tool.

4. **Tell stories.** Communicators should use the metaphor to tell stories about successful services, and to ensure that such stories remain focused on the features of *contexts* rather than the decontextualized trials and tribulations of *individuals*.

5. **Emphasize both complexity *and* feasibility.** Communicators should use the complexity inherent in the notion of redirecting a river to emphasize the gravity of the treatment task. However, they should also emphasize the *feasibility* of redirection if proper supports are in place. This focus on feasibility is critical if communicators are to avoid cuing fatalistic thinking about the enormity of the treatment task and skepticism about the prospects for positive outcomes.

6. **Bring in prevention, where appropriate.** While not a central component of the metaphor, there are a number of ways to extend the metaphor to encompass prevention if and when communicators wish to do so. For example, experts might talk about "intervening upstream" to interrupt the factors that "feed" a river and contribute to its carving a deeper and deeper channel.

Resulting Metaphor

Think of addiction as a river that's been formed by water running for a long time over rock. Redirecting a river takes long-term efforts by a team of skilled people — such as engineers, builders and environmental scientists. If the work of rechanneling begins early, when the groove is still shallow and the river is small, the work will be easier. And once the river is redirected, there will always be things to do to keep it from finding its way back to its old groove. Like redirecting a river, addiction services work best when they begin early, include a team of specialists working together, and make a long-term commitment.

II. THE RESILIENCE SCALE

Experts were presented with a brief explanation of the *Resilience Scale* metaphor. They were then asked to design a presentation in which they used the metaphor to answer the following question: *Why do people develop addictions and what can be done to better address this issue?*

Positive Effects

1. ***Resilience Scale* helped experts communicate a set of key principles from the science of child development and addiction.** Experts used the metaphor to communicate the following points:

    - Genetic factors play an important role in shaping outcomes, including an individual's propensity to develop an addiction.
    - Genetic factors interact with environmental influences, such that outcomes and individual differences can *only* be understood with reference to *both* genes and experiences.
    - Genetic instructions are not fixed — they are affected by experiences over time, which in turn shape the effect of subsequent experiences.
    - Early experiences have a significant impact on a range of outcomes, including susceptibility to addiction.
    - Development is a dynamic process that changes over time.
    - The degree of changeability, or "plasticity," is not uniform over the life course. There are periods of heightened plasticity during what scientists refer to as "sensitive periods."
    - There are multiple ways of intervening to improve outcomes. Effective strategies include reducing risk factors, increasing protective factors, and building the capacity for resilience over time. Interventions that work to *prevent* negative outcomes, including addiction, *before* they occur are particularly important and powerful.

2. The metaphor was effective in giving non-experts a way of talking and thinking about development and addiction. From previous research in Alberta, FrameWorks researchers know that getting people to engage in conversations about individual differences and developmental outcomes is difficult — and getting them to engage in these

issues in ways that are in line with the science on these topics is even more difficult. Introducing the metaphor allowed members of the public to engage in discussions of development and addiction in deep and relatively complex ways — asking questions using the scale, using gestures from the metaphor to think through situations, and using the metaphor to tell stories about the importance of environmental experiences, and the potential to improve developmental and addiction outcomes.

3. *Resilience Scale* was powerful in helping experts answer questions from both other experts and members of the public. Expert participants in the Usability Tests fluidly employed the metaphor to respond to questions from other colleagues, as well as from members of the general public. This level of fluidity and the utility of the metaphor to carry scientific explanation are important marks of its usability and effectiveness. In addition, the breadth of the questions that were answered by deploying the metaphor (everything from why siblings are different to how best to treat addictions) shows that the metaphor is conceptually rich, while still being accessible and understandable.

4. In addition to helping experts answer questions, the metaphor was used to counter dominant cultural models. There were instances in which members of non-expert audiences made comments and asked questions that were flavored by dominant cultural models identified in earlier FrameWorks research.[6] These included models of individual responsibility and willpower, as well as senses of fatalism and futility regarding addiction treatment. When these dominant, but unproductive, perspectives emerged in conversation, experts deployed the metaphor to redirect discussion towards a broader and more productive understanding of development and addiction. In particular, experts used the scale to direct attention to the importance of experiences (to inoculate against individualism) and to the dynamism of development (to inoculate against fatalism and futility). In so doing, they effectively communicated the potential of interventions to improve outcomes.

5. Experts stretched the metaphor to explain aspects of their work, frequently going off script in productive, creative and effective ways. In another hallmark of a highly usable metaphor, experts were able to "make it their own" — harnessing basic elements of the metaphor (in this case, the system of a scale) but deploying it in ways that fit with their style and allowed them to make desired points. For example, one expert used the shape of the fulcrum, and the ways in which the shape affects how the scale responds to weight, as a way to talk about what developmental scientists refer to as "differential susceptibility to context." Another expert put wheels on the fulcrum to emphasize developmental plasticity.

6. The metaphor was highly visual. As noted in previous FrameWorks research,[7] but highly evident in these Usability Tests, the scale metaphor was extremely conducive to, and effectively conveyed via, visual presentations. Experts enacted the scale with their hands and bodies while explaining ideas about development and addiction, and drew diagrams to illustrate concepts. This is a notable strength of the metaphor, and further evidence of its usability.

7. The metaphor was easily integrated into other aspects of the Core Story. Several of the experts involved in the Usability Tests had knowledge of the Core Story of Child Development, and were able to easily and creatively weave the scale metaphor into the Core Story by combining it with values and other metaphors. For example, one expert explained that the fulcrum can be thought of as a brain with developing "brain architecture." Another expert talked about how negative experiences during early childhood can generate faultlines in the fulcrum. Another group of experts introduced the idea that toxic stress is caused by failing to counterbalance chronic negative weight with the addition of protective factors, and explained that loading the scale in this way can tip people towards addiction. Another expert noted that effective addiction treatment takes aim at the fulcrum and its ability to redirect outcomes before the channel in which the fulcrum sits gets too deep — combining the scale with the *Redirecting the River* Explanatory Metaphor described above.

8. The metaphor facilitated productive conversations about addiction treatment. Experts in Usability Tests typically followed a common explanatory pattern — first setting up the scale system and using it to explain fundamental principles of development, and engaging the audience in discussions of what could be done to manipulate the system in order to achieve different outcomes. During these discussions, experts used the components of the scale to describe what makes effective addiction treatments work and solicited ideas from their audiences about alternative strategies that might also be effective. The ability of the metaphor to create rich discussions about current strategies — and to anchor conversations about potentially promising new approaches in the neuroscience of development and addiction — is an exciting finding. It suggests that the metaphor will be a powerful tool not only for experts to use when communicating with the public, but also for members of the field to use in conversations with each other around strategies to improve child development and address addiction. Several experts explicitly recognized this potential by indicating that they planned on using the metaphor in their places of work.

9. The fulcrum is the key. Unlike other contexts in which we have tested the usability of the *Scale* metaphor,[8] Albertan experts gravitated towards the scale's fulcrum in their discussions and explanations. It is clear that this aspect of the scale is both particularly salient and highly useful to experts in this context. As one expert informant said, "This is *all* about the fulcrum — it's the key to this model."

10. There was a set of sticky and productive terms that experts and audience members used with scale metaphor. These terms included *stack* (in both noun and verb forms), *pile* (in both noun and verb forms), *loading*, *tipping*, *shifting*, *sliding/slide-able* and *dynamic*.

Critiques and Suggested Changes

While the metaphor was highly usable, experts noted several challenges associated with it. These are addressed in the recommendations and the final presentation of the metaphor (offered below).

1. The balance problem. Two experts recognized the temptation to talk about "balance" as the desirable outcome. The metaphor relies on the ideal state being "tipped in a positive direction." This suggests the importance of stressing the desired position of the scale at the outset of the message. *The importance of establishing the desired position of the scale was addressed by adding language that "We want children to turn out well, which means we want the scale to be tipped toward the positive" to the iteration. In addition, we advise that when the scale is drawn, it should be drawn in the tipped/slanted, not the balanced/horizontal, position.*

2. "We need visuals!" The most frequent comment from experts was the need for tools that leverage the metaphor's visual power. Suggestions included the development of a scale prop that could be used to structure scientific explanations about the role of experiences in developmental outcomes, and the production of a new video that uses the scale as its centerpiece to talk about development, the early roots of addiction, and the power of an early and preventative approach to addressing addiction. *We strongly recommend that those using the metaphor <u>always</u> illustrate the physics of this system, either with their hands, an object or prop, drawings, or even a digital tool or simulation. A good deal of the power of the metaphor derives from its basic physics, which are most effectively activated and leveraged for explanation via physical representations. These Usability Tests cement our recommendation that the development of a standardized physical or digital representation of the scale system would be a powerful communications tool.*

3. "I'd really like more practice with this." Finally, experts were clear in their need (and desire) for more practice in using the metaphor, particularly in using it with other parts of the Core Story.

Recommendations for Use

Based on our findings regarding the positive effects of the *Scale* metaphor, and the potential challenges associated with its use, we offer the following recommendations:

1. **Communicators should emphasize the following features of the source domain (scales):**

    - There are two sides to a scale — what gets put on each side influences how the scale tips.
    - There is also a fulcrum, which starts at some position along the scale.
    - The shape and position of the fulcrum affect how the scale responds to weight.
    - The shape and position of the fulcrum can change over time, which in turn changes how the scale responds to weight.

These components of the source domain should be applied to make the following points:

- There are factors that either facilitate or threaten positive development. Developmental outcomes are shaped by exposure to such factors.
- Genes represent a biological starting point that mediates the effects that risk and protective factors have on the developmental process and its outcomes.
- There is variation in these starting points, which makes some individuals more sensitive to environmental experiences than others.
- This biological mediator is not fixed; it can change over time. Such changes, in turn, affect how environmental experiences shape outcomes.
- There are particular periods where this biology is highly sensitive and apt to change. Two of these "sensitive periods" are early childhood and adolescence.

- There are many strategies that can be employed to improve development and its outcomes. Programs can be designed to increase protective factors, reduce risk factors and work over time to improve skills and capacities so as to increase the chances of positive outcomes despite adversity (resilience).

2. **Use visuals.** As noted above, visual or physical representations should always accompany the metaphor. In its most simple form, this could consist of representations of the scale and its dynamics using hand gestures. More effective, however, would be a physical or digital model of the scale that would allow presenters and their audiences to engage with the system in order to better understand the basic principles of development that the scale is capable of illustrating.

3. **Employ sticky language.** Those using the metaphor should employ language that was identified here as both sticky and effective. Such language includes *stacking*, *piling*, *loading*, *tipping*, *shifting*, *sliding/slide-able* and *dynamic*.

4. **The fulcrum is your friend.** Experts in the sessions gravitated towards the fulcrum in their presentations, and did so to good effect. While the fulcrum might be seen as a complex dynamic of the scale system, its invocation is essential to communicating basic principles around epigenetics, individual differences and developmental outcomes. These Usability Tests show that the fulcrum *can* be effectively used and, furthermore, that the power of this tool is tied to the use of this element.

5. **Be flexible with what goes on the scale.** The unassigned space on the scale (i.e., the empty sides of the scale) is a flexible attribute of the metaphor that allows experts to tailor the experiences and factors they highlight to specific audiences and interests. For example, experts might load the scale with different factors when presenting to a policy maker than when presenting to a group of young parents. Those using the metaphor should embrace this flexibility and use it to their advantage in crafting articulations of the metaphor that are most appropriate to specific audiences.

6. **Emphasize that outcomes are always a product of both genes and environments.** The direction a scale tips is inherently the product of both what you put on the scale, and the position and shape of the fulcrum. Those using the metaphor should use this feature to highlight the synthetic relationship between genes and environments in shaping outcomes.

7. **Highlight dynamism and plasticity.** Finally, communicators should highlight the dynamism of the scale system — both in terms of being able to shift weight and slide the fulcrum — as a way of making important points about the plasticity and flexibility of the developmental process and the power and potential of interventions to improve outcomes.

Resulting Metaphor

You can think of development as a scale that has two sides where factors and experiences get stacked.

The factors placed on either side determine how the scale tips. Negative factors such as stress, violence and neglect get stacked on one side, while positive factors such as supportive relationships and opportunities to develop skills get placed on the other side. We want children to turn out well, which means we want the scale to be tipped toward the positive.

We also know that there's a fulcrum point. Where that fulcrum point is positioned influences how easily the scale tips towards positive or negative outcomes.

This fulcrum is especially slide-able in the sensitive period of early childhood, and then again in adolescence. At these times, adverse experiences can move the fulcrum and make the child less resilient — that is, more likely to tip towards negative outcomes, such as addiction, when they face stressful or difficult experiences later in life.

The key is that there are things we can do to tip the scale in the positive direction. One really important way to do that is to add positive factors on the positive side and take negative factors off the negative side.

But what's also really important is that by supporting positive development and building skills in those slide-able periods, we can make the scale less likely to tip towards the negative side — towards addiction and other poor outcomes — even when it's loaded with negative weight.

This is why it is so important to reduce sources of serious adversity, increase supportive factors, and try to shift the fulcrum by helping children develop skills and abilities that they can rely on later in life when negative weight comes onto the scale.

III. THE REWARD DIAL

Experts were presented with a brief explanation of the *Reward Dial* metaphor and were asked to create a presentation in which they used the metaphor to answer the following question: *Why do some people develop addictions and what can be done to better address this issue?*

Positive Effects

1. **The metaphor helped experts communicate a set of key principles about the science of addiction.** Experts used the metaphor to communicate the following points:

    - *Addiction is brain-based.* Experts used the metaphor to anchor talk about addiction in the brain and its functioning. They used elements of the "dial" to explain how the brain's wiring and condition or configuration underpins addiction and addictive behaviors.

    - *Addicted and non-addicted brains are different.* Experts were able to use the metaphor to describe the differences between addicted and non-addicted brains. They emphasized that, in the non-addicted brain, the reward system responds dynamically to external stimuli — but that this function is disrupted in the addicted brain.

    - *Addiction concerns the risk-reward system.* Experts used the metaphor to explain that addiction is a state in which the risk-reward system becomes disconnected or miscalibrated, resulting in continued use, cravings, and the feeling of "need."

    - *Addiction is not about pleasure-seeking.* Experts used the metaphor to communicate the idea that addiction is not about seeking pleasure but, rather, about seeking a sense of "normalcy" ("having to turn the dial up higher and higher just to hear any volume at all"). In so doing, experts used the metaphor to emphasize that addiction is not failure of self-discipline or willpower, but a brain-based phenomenon.

    - *Addiction can be treated.* Although communicating the elements of high-quality addiction treatment was not one of its primary tasks, experts were able to extend the metaphor to encourage richer discussions of ways to address addiction. For example, experts used the concept of a "toolbox" with tools to fix a dial to describe the continuum of services available for those facing addiction. In other instances,

experts discussed the importance of having "technicians" with the expertise to "recalibrate" a dial.

2. **The language of the metaphor was taken up easily and often.** Experts easily and repeatedly used the language of a reward "dial" throughout Usability Tests. For example, the language of "calibration" (e.g., "calibrate," "recalibrate," "uncalibrated") was frequently evoked to describe the state of the dial and outline the actions that should be taken to restore it to appropriate functioning. Experts also used terms related to sound systems, like "bass" and "feedback," to explain in greater detail the implications of an uncalibrated dial, or the challenges that addiction presents. In addition, more peripheral language, like "reset" and "preset," was used consistently.

3. **The metaphor was highly gestural.** Experts gestured frequently and consistently while using the metaphor (for example, making a repeated, circular movement of the hand with the fingers splayed that demonstrated "turning a dial"). As noted with *Resilience Scale*, the natural use of gesture that accompanies this metaphor is an additional testament to its effectiveness and usability.

4. **The metaphor was used to counter dominant cultural models.** One of the most dominant, and unproductive, models of addiction observed in previous FrameWorks research is one based on individual responsibility, willpower and self-discipline — in which individuals are understood to be solely responsible for both the causes of, and solutions to, addiction. When these models emerged in discussion with non-expert audiences, experts were able to use the metaphor to redirect the conversation towards a more science-based understanding of addiction as a complex, brain-based phenomenon.

5. **Experts extended the metaphor to highlight not only the science of addiction, but the treatment of addiction.** Though the metaphor primarily addresses questions about the neurobiological basis of addiction, experts used the metaphor productively to talk about important aspects of treatment. They focused, for example, on the "time and expertise" required for "technicians" to recalibrate a dial — drawing parallels between this type of expertise and the expertise required to treat various forms of addiction. One expert introduced the idea of "maintenance" in order to discuss the idea that treatment is an ongoing and long-term process. The general domain of technical expertise, and the "toolbox" of services that can be brought to addiction treatment, allowed experts to talk about the need for multi-modal, high-quality and interdisciplinary treatment for addictions.

6. **The metaphor was used with other elements of the Core Story.** Experts found the metaphor consonant with other Core Story frame elements and effectively used them in combination. For example, one expert familiar with the *Brain Architecture* metaphor suggested that it could be helpful to think of the *Reward Dial* as part of the brain's architecture. In so doing, this expert highlighted how the risk-reward system is "built" in the same way as other areas of brain architecture.

Critiques and Suggested Changes

The following challenges and critiques were considered and addressed in the revised version of the metaphor presented below.

1. **The age of the audience and outdated terminology.** Some experts balked at the idea of talking about a dial, claiming that it was "outdated" and not "concrete enough for teenagers." However, the stickiness of the term and the pervasiveness of gesture suggest that the dial is more salient than experts immediately assume. *While no changes have been made to the central language of the metaphor, we recommend that experts consider the range of "dials" (stereo dial, iPod dial, etc.) available to draw upon in their presentation of the metaphor.*

2. **The issue of agency and control.** Experts expressed some confusion about who was turning the dial, and were concerned that the metaphor implied that the *individual* is responsible for turning the dial. As one expert put it, "*Reward Dial* makes it sound like 'reward' is something they're doing for pleasure, when we know the addictive brain isn't [doing this] intentfully." *The revised iteration of the metaphor presented below was modified to emphasize that experiences are the agent that turns the dial.*

3. **"More practice!"** Experts — particularly general health practitioners — noted that the metaphor and the science that it represents are complex, and expressed the desire for more time and training to become fluid with the metaphor and the explanations it carries. These comments suggest the importance of dedicated training, feedback and practice in order for experts to become fully comfortable using the metaphor.

Recommendations for Use

Based on findings regarding the positive effects of the *Reward Dial* metaphor, and the potential challenges associated with its use, we offer the following recommendations for use.

1. **Communicators should emphasize the following features of the source domain (dials):**

    - Volume dials on a stereo system are turned up or down to control the amount of volume we hear.

    - When a dial is miscalibrated or reset at a lower level, it has to be turned up higher and higher just to hear any volume at all.

    - With the right kind of technical expertise, dials can be recalibrated and reconnected to the system they are designed to regulate.

These components of the source domain should be applied to make the following points:

- There is a basic system in our brain, called the "risk-reward system," that connects external experiences to our feelings of reward. This system regulates the amount of reward we feel in response to different experiences.

- In the addicted brain, this reward system is disconnected from experiences in a way that motivates continued use, cravings, and the feeling of "need."

- Addiction is *not* about seeking increasing amounts of pleasure, but about seeking a feeling of "normalcy."

- With time and professional support, the regulatory function of the risk-reward system can be repaired.

2. **Highlight sticky language and gesture.** Communicators should use the terms "dial," and associated stereo/sound-relevant terms, when employing the metaphor, and should employ gesture as well, to make the metaphor visual for audiences.

3. **Be explicit about what makes the dial turn**. There is a tendency for members of the public to put individual agency front and center when discussing addiction, and to assume that individuals themselves are responsible for turning the dial up or down. Communicators should explicitly state that *experiences* and *exposures* turn the dial — not individuals — in short, the context is the dial-turning agent.

4. **Emphasize the concept of volume.** The concept of volume, and portrayal of addiction as a state in which the volume dial/reward system is no longer appropriately calibrated to regulate the amount of volume heard/the feelings of reward experienced, is a critical part of the metaphor, and one which experts used to great effect. Communicators should highlight this portion of the metaphor in their explanations, emphasizing that addiction is not about the desire to "listen to music at full blast," but about trying to "hear any volume at all."

5. **Emphasize that treatment is possible.** Experts should be careful to avoid language like "broken dials" or "bad wiring," as such language is likely to cue deterministic and fatalistic senses of addiction. Instead, they should emphasize that, with the right support, technical expertise and "toolbox" of services, dials can be recalibrated to get back to healthy levels of volume.

Resulting Metaphor

Each of us has a reward dial in our brains that gets "turned up" to provide us with a feeling of reward in response to pleasurable experiences. It's a bit like the volume dial on a stereo — some experiences turn the reward volume up in our brains.

Normally, that dial helps keeps us healthy and functional, keeping us going back for experiences that are positive and rewarding. But in an addicted brain, where the dial is continually cranked up too high, the brain reacts by recalibrating the dial to a lower setting.

People often think that addiction comes from a person's desire to keep turning up the reward volume more and more. But research tells us a different story. Once the addicted brain sets the baseline volume lower than it should be, people seek experiences that turn the dial higher and higher in an effort just to hear any reward volume at all. Helping people get their reward dials recalibrated back to healthy levels is hard, but with time and the right technicians and supports, it can be done.

ABOUT THE 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.

FrameWorks Institute | 1333 H Street NW Suite 700 West Washington, DC 20005

www.FrameWorksInstitute.org

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ENDNOTES

[1] Kendall-Taylor, N., & Haydon, A. (2013). *Examining the usability of the addiction explanatory metaphors: Usability test analysis.* Washington, DC: FrameWorks Institute.

[2] One additional addiction expert-to-public session was conducted for *Reward Dial*, yielding four sessions for that metaphor and three sessions for each of the other two metaphors.

[3] Kendall-Taylor, N. (2010). *Rounding up the associations: How perceptions of addiction are recruited*. Washington, DC: FrameWorks Institute; O'Neil, M. (2010). *Changing addiction from a "sin problem": Peer discourse sessions on addiction in Alberta.* Washington, DC: FrameWorks Institute.

[4] Kendall-Taylor, N., & Haydon, A. (2013). *Examining the usability of the addiction explanatory metaphors: Usability test analysis.* Washington, DC: FrameWorks Institute.

[5] Kendall-Taylor, N. (2010). *Rounding up the associations: How perceptions of addiction are recruited*. Washington, DC: FrameWorks Institute; O'Neil, M. (2010). *Changing addiction from a "sin problem": Peer discourse sessions on addiction in Alberta.* Washington, DC: FrameWorks Institute; Iyengar, S. (1991). *Is anyone responsible? How television frames political issues.* Chicago, IL: University of Chicago Press.

[6] Kendall-Taylor, N. (2010). *Rounding up the associations: How perceptions of addiction are recruited*. Washington, DC: FrameWorks Institute; O'Neil, M. (2010). *Changing addiction from a "sin problem": Peer discourse sessions on addiction in Alberta.* Washington, DC: FrameWorks Institute.

[7] Kendall-Taylor, N. (2012). *The resilience scale: Using metaphor to communicate a developmental perspective on resilience.* Washington, DC: FrameWorks Institute; Erard, M., & Kendall-Taylor, N. (2013). *Resilience usability trials analysis.* Washington, DC: FrameWorks Institute.

[8] Erard, M., & Kendall-Taylor, N. (2013). *Resilience usability trials analysis.* Washington, DC: FrameWorks Institute.