



# FRAME WORKS INSTITUTE



## Dials And Rivers:

Using Explanatory Metaphors  
To Expand Understanding Of  
Addiction And Its Treatment

### A FRAMEWORKS RESEARCH REPORT

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## Introduction

The research presented here was conducted by the FrameWorks Institute for the Alberta Family Wellness Initiative and supported by the Norlien Foundation. The research is part of an ongoing effort to communicate about new addiction science and to reframe persistent public understandings of addiction and addiction treatment in the Province of Alberta. The goal of the larger project is to create a set of tools with empirically demonstrated effectiveness in increasing public understanding of the mechanisms underlying addiction in order to create public support for more effective policies for preventing and treating addiction. The research presented in this report deals with the role of *Explanatory Metaphors* in this larger effort to translate and reframe the science of addiction.

Explanatory Metaphors are frame elements that restructure and channel the ways that people talk and reason about issues and concepts. As such, these communications tools are useful in efforts to shift the frameworks that people access and employ in processing information. By fortifying understandings of abstract phenomena (such as the links between brain systems and addiction), Explanatory Metaphors play a key role in strengthening Albertans' understanding of and support for policies that prevent addiction and provide better services for people dealing with this issue.

Following FrameWorks' iterative approach to communications research (Strategic Frame Analysis™<sup>1</sup>), FrameWorks researchers have studied the “cultural models”<sup>2</sup> — shared, but implicit, assumptions and understandings — that shape Albertans' understandings of addiction and addiction treatment. As part of their role in helping people make sense of information, cultural models can sometimes constrict the ways that people are able to look at an issue and incorporate new information into their interpretations. This can make some messages “hard to think,” and impede policy and program support.<sup>3</sup>

FrameWorks' research has found that Albertans understand addiction as the result of “liking something too much,” and not having the willpower to resist or cease consuming a substance or doing some activity.<sup>4</sup> The role that the human brain plays in creating and regulating all pleasurable experiences is largely missing from the public's understanding of addiction. Without a complete picture of how this brain system functions, an understanding of its dysfunction is impossible. The lay understanding of how addictions are managed and treated is similarly incomplete. Laypeople usually understand treatment as a process that requires an individual to willingly admit to a problem and then responsibly seek help. The misunderstanding of the role of pleasure systems, and a lack of familiarity with what science knows about effective addiction treatment programs, narrow the understanding of the challenges that addicted individuals face and create an inability to think about how society might use public resources and policy to best address this issue and its social ramifications.

New research about the brain basis for pleasure — what is known as the risk-reward system — has become increasingly robust. Using this science to make policy and programmatic decisions has the potential to prevent addiction and improve addiction treatment in Alberta. This potential points to the need for careful and empirically based research designed to translate principles from the science of addiction for members of the general public and policymaking audiences. FrameWorks' research has shown that, although it is incomplete, members of the Alberta public do hold a thin understanding that addiction has something to do with the “wiring of the brain.” This understanding is fertile ground for metaphors to structure more nuanced and scientifically robust connections between brain systems and addiction. Similarly, Albertans appear to be somewhat familiar with addiction treatment, though often through pop cultural depictions. Here, translating principles about effective treatment is a matter of getting people to downplay the significance of individual willpower and recognize other aspects that influence the effectiveness of treatment approaches.

From the outset of this project, FrameWorks researchers, with the help of experts on the science of addiction, conceived of two discrete sets of communication needs, each of which would be met by its own metaphor. One metaphor would be developed to explain the brain's risk-reward system and how dysfunction in this system undergirds addiction. A second metaphor would be developed in order to help people understand key features of effective addiction treatment. This report describes the research process that produced metaphors to meet these two conceptual tasks, and provides a guide on how to use these communications tools.

We note that even the best Explanatory Metaphors cannot accomplish everything that needs to be done in reframing a complex issue like addiction. Other frame elements (values, messengers, visuals, tone, explanatory chains, social math and additional Explanatory Metaphors<sup>5</sup>) need to be tasked with addressing other routine misdirections in public thinking. As such, the research described here is one part in a reframing project that has produced values and other metaphors that are effective in creating a reframed story of the science of addiction.<sup>6</sup>

## Executive Summary

FrameWorks' research demonstrated that the *Reward Dial* Explanatory Metaphor was powerful in channeling thinking about the organic dysfunction that underlies addictive behaviors. The research process also demonstrated that the intersections of the domains of construction, geology, navigation and journeys captured in the *Redirecting The River* Explanatory Metaphor were effective in helping people think about the characteristics of high-quality addiction treatment. In fact, the power and effectiveness of the *Redirecting The River* metaphor is likely to have increased due to the salience of rivers and their potentially disruptive effects following the June 2013 floods in Alberta.

### The Reward Dial

**Reward Dial:** 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 keep 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.

### Strengths of the metaphor

In general, the *Reward Dial* is a communicable and usable metaphor that proved highly effective in structuring how participants (both experts and members of the public) talked about how addictions develop and what differentiates people who become addicted from those who do not. The following are more specific strengths of the metaphor:

1. **Gets addiction firmly in the brain.** The metaphor plants discussions of addiction and its causes firmly in the brain. The metaphor moderates tendencies to think about lack of willpower as the cause of addiction, and leads people back to the

importance of the brain and neurological systems in thinking about the causes and dimensions of addiction.

2. **Connects addiction and mental health.** Once the metaphor roots addiction in the brain, the moral charge of addiction as a deficiency in willpower is reduced and people, of their own accord, begin to make productive connections between mental health and addiction.
3. **Leverages productive underlying metaphor of the brain as machine.** The metaphor dovetails with the popularity of thinking of the brain as a general sort of machine. One reason that the *Reward Dial* metaphor helps people have productive and scientifically aligned discussions of the brain is that it provides specific, concrete details about the widely held general metaphor that the brain is a sort of machine.
4. **Connects addiction to disequilibrium of a neural system.** The metaphor inoculates against one common understanding of the causes of addiction — that people who are addicted seek pleasure to extreme degrees simply because they *enjoy* substances or activities “too much.” According to this understanding, addiction is seen as a moral issue about pleasure and control. This trivializes the degree to which addictions pose serious health and social problems. In contrast, the *Reward Dial* metaphor redefines addiction as a condition that pushes the risk and reward system out of calibration and actually makes experiencing pleasure *more* difficult.
5. **Emphasizes the shared characteristics of addictions.** The *Reward Dial* metaphor inoculates against the “every addiction is unique” perspective, which limits people’s ability to think about the role of public policies and programs in addressing addiction. Seeing a system that underlies all addictions helps people think more productively about the causes of addiction and about the role and importance of public programs in addressing this issue.
6. **Compatible with other FrameWorks Explanatory Metaphors.** The *Reward Dial* is highly compatible with other Explanatory Metaphors FrameWorks has developed and tested in Alberta to translate the science of early child development. For example, *Toxic Stress* can be discussed as a factor that can cause the *Reward Dial* to become disconnected, and the *Outcomes Scale* can be used to elaborate the process by which environmental factors have an effect on disconnecting the *Reward Dial*. Furthermore, the value of *Ingenuity*, which has proven effective in reframing addiction programs and policies in Alberta, has a ready fit with the *Reward Dial* metaphor in discussing the importance of thinking innovatively about interventions that can recalibrate the reward dial.



## Redirecting the River

**Redirecting The River:** 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.

### Strengths of the metaphor

*Redirecting The River* is also a highly communicable metaphor, usable by both experts and members of the public alike. It is effective in channeling people’s thinking away from the idea that willpower is the primary — if not the only — feature that explains successful treatment toward the recognition of a set of characteristics that underlie effective, high-quality addiction treatment programs and policies. While the metaphor was tested prior to the 2013 Alberta floods, these events are likely to heighten many of the effects noted below, particularly the salience and usability of the metaphor, its ability to channel attention away from willpower, its connection with preventive approaches, and the ability of the comparison between addiction and rivers to instill a productive sense of urgency around the treatment of the issue.

1. **Highly generative.** The metaphor generates a number of productive matches between the river domain and the addiction treatment domain — that is, ways in which rerouting a river is “like” science concepts of effective treatment. These include geographical features (e.g., forking rivers), characteristics of types of water (such as “smooth” or “rough”), and navigation (e.g., getting blocked by rocks). In many cases, the metaphor led participants to creative innovations that were not mentioned in the original presentation of the metaphor but that were in line with the science of addiction treatment.
2. **De-emphasizes willpower.** One of the most powerful features of this metaphor is the way it replaces the notion that all that is required for effective treatment is that the addict really “wants” to get help, with the recognition of the importance of a set of program characteristics, including type and amount of support and the duration and timing of treatment.
3. **Emphasizes that addictions share characteristics.** This metaphor, like the *Reward Dial*, channels people’s thinking and talking away from granting each addiction a unique cause — an assumption based on the common belief that addiction stems from a specific emotional deficit in an individual’s life. When people

are able to consider the commonalities among addictions, the importance and effectiveness of public policies and programs become easier to think.

4. **Compatible with other FrameWorks Explanatory Metaphors.** *Redirecting The River* is highly compatible with *Faultlines in the Brain*,<sup>7</sup> another landscape/geological metaphor that FrameWorks previously developed to explain the connection between development and addiction.



## What Is An Explanatory Metaphor?

An Explanatory Metaphor can be thought of as a bridge between expert and public understandings. Presenting a concept in a way that the public can readily deploy to make sense of new information channels the way people think and talk about that concept. More specifically, FrameWorks defines an Explanatory Metaphor as a research-driven, empirically tested metaphor that captures and distills a concept by using an explanatory framework that fits in with the public's existing patterns of assumptions and understandings (cultural models).<sup>8</sup> In this way, an Explanatory Metaphor renders a complex and/or abstract problem as a more familiar analogy or metaphor. By pulling out salient features of the problem and mapping onto them the features of concrete, immediate, everyday objects, events or processes, the Explanatory Metaphor helps people organize information into a clear picture in their heads. This has the potential to make people better critical thinkers and more careful media consumers who are ultimately better situated to think about how policy affects social issues.

On the basis of this theoretical perspective, FrameWorks has built a robust, reliable protocol for determining what an effective Explanatory Metaphor looks like and how it behaves.<sup>9</sup> An effective Explanatory Metaphor:

- (1) improves understanding of how a given phenomenon *works*;
- (2) creates more robust, detailed and coherent discussions of a given target concept (e.g., what causes addiction and how best to address this issue);
- (3) is able to be applied to thinking about how to *solve* or *improve* a situation;
- (4) inoculates against existing dominant, but unproductive, default patterns of thinking that people normally apply to understand the issue;
- (5) is highly communicable, moving and spreading easily among individuals without major breakdowns or mutations;
- (6) is a linguistic resource for social interaction (i.e., people can incorporate it into their stories and conversations); and finally,
- (7) is self-correcting. When a breakdown in thinking does occur, people using the Explanatory Metaphor can redeploy it in its original form, where it is able, once again, to clarify key aspects of the issue.

## Why The Risk-Reward System Needs An Explanatory Metaphor

When designing and testing Explanatory Metaphors, FrameWorks' researchers employ the results of earlier qualitative research, cultural models and metaphor theory, and an understanding of the communications challenges presented by a particular topic. The task for each Explanatory Metaphor is carefully chosen from among the "gaps" that characterize the distance between expert and lay thinking. While some gaps are better suited to other frame elements (values, social math, etc.), certain tasks are chosen that adhere to what we know metaphor does best. We conceived of the ways that an Explanatory Metaphor must work in explaining the risk-reward system in the following way:

1. The metaphor should communicate how the risk-reward system works in a way that is consonant with the science.
2. The metaphor should structure an understanding of normal pleasurable experiences and de-link addiction from the notion that addiction is about the desire for extreme amounts of pleasure.
3. The metaphor should enhance the sense that addictions are treatable and inoculate against the view that "damage done is damage done."
4. The metaphor should help people understand that all addictions share an underlying neural component, regardless of individuals' unique experiences and backgrounds.

## Why Effective Addiction Treatment Needs An Explanatory Metaphor

Similarly, based on previous research, FrameWorks' researchers conceived of the ways that an Explanatory Metaphor must work on explaining the characteristics of high-quality and effective addiction treatment as the following:

1. The metaphor has to establish the understanding that effective treatment for addiction is ongoing (i.e., extended over time) and involves a team of professionals who can use different methods and tools — while still preserving the sense that successful outcomes are, indeed, possible.
2. The metaphor has to inoculate against the view that individual willpower is the sole determinant of whether addiction treatment will yield positive outcomes.
3. The metaphor must be applicable to a range of addictions; that is, it has to shift people's thinking away from the focus on unique personal histories of people with addictions and towards the common processes that underlie a range of addictions.
4. The metaphor has to allow people to see that *early* assessments and interventions make successful treatment outcomes more likely.

Below, we briefly discuss the process by which FrameWorks' researchers identified, developed and empirically tested the power of the *Reward Dial* and *Redirecting The River* metaphors in broadening Albertans' understandings of addiction and addiction treatment. We then present the findings from this research and conclude with specific recommendations about how best to deploy these communications devices in reframing addiction in Alberta. The Appendix provides more details about the research and analytical methods employed.

## Why We Test Explanatory Metaphors

Most people can easily identify, and even generate, metaphors in order to explain, teach or argue points and ideas. Yet, metaphors are integral to human thought at levels that evade conscious detection and reflection.<sup>10</sup> Each metaphor proposes a recategorization of a concept in mind. Because concepts already exist in an internalized web of other meanings, these recategorizations implicate and activate other concepts, causing people to rethink how they are categorized, and their relationships to one another. These consequences may also interact with culture-specific interpretations and default cognitive preferences, endangering the very communications goal that the metaphor is intended to serve.

Because of this potential for metaphors to have unintended, negative effects in relation to communications goals, FrameWorks tests its Explanatory Metaphors in order to observe and measure the *actual* directions that metaphors take in social interaction and discourse. These tests allow us to look at the “cognitive downstream” — to observe what happens to metaphors as they live and breathe in complex cultural, political and linguistic ecologies. Testing metaphors further enables us to avoid subjective responses to metaphors, and inoculate against arguments about a metaphor’s effectiveness based on from-the-hip assessments of “what most people think” or “what most people know.” That is, testing metaphors allows us to see their *actual* effects on cognition and meaning-making, and to avoid potentially disastrous armchair predictions.

A final reason for testing is that many of the most persistent metaphors that we use in our daily language have evolved over long periods to fit their cultural circumstances and be usable by human brains. We use such metaphors because they are present in our language and our culture, and they are present in our language and culture because they have outlasted or proven themselves to be more cognitively fit than other related attempts. Because issue advocates do not have the luxury of long periods to see what might emerge naturally, we compress this evolutionary schedule to produce a metaphor with immediate cognitive and social fit. Our methods of testing Explanatory Metaphors are designed with these considerations in mind.

## How Explanatory Metaphors Are Identified And Tested

### **Phase 1: Mapping the Gaps**

FrameWorks' research team first conducts two types of interviews: Cultural Models Interviews and Expert Interviews. Cultural Models Interviews are conducted with members of the general public and are designed to gather data 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 conducted with researchers, advocates and practitioners who possess an expert or technical understanding of the given phenomenon. These interviews are designed to elicit the expert understanding of the issue. Comparing the data gathered from these two types of interviews reveals the gaps that exist between how experts and average Albertans understand and approach issues.

### **Phase 2: Designing Explanatory Metaphors**

FrameWorks' interdisciplinary research team then analyzes transcripts of the interviews conducted in Phase 1 to generate a list of metaphor categories that capture salient elements of the expert understanding in metaphors accessible to the general public, using approaches to metaphor from cognitive linguistics and psycholinguistics. The result of the design process is a list of metaphor categories (e.g., *Engines*) and multiple candidate Explanatory Metaphors in each category (e.g., *Reward Throttle*). The initial Explanatory Metaphors generated from this phase are listed in the Appendix.

### **Phase 3: Testing Explanatory Metaphors**

FrameWorks tests each set of candidate Explanatory Metaphors in multiple research formats. The process begins with a “smell testing” by professionals (researchers, practitioners, etc.) in the relevant field. In informal conversations with FrameWorks researchers, the professionals are asked whether or not they could imagine themselves using the candidate metaphors in their daily work. Next, we hold On-the-Street Interviews with around eight dozen individuals recruited randomly in two Calgary locations. These are followed by experimental surveys conducted with a sample of 2,400 participants; these surveys test the candidate metaphors on measures of issue understanding and metaphor application. Next, we take the most effective Explanatory Metaphor candidates into another phase of qualitative testing, Persistence Trials, that mimics the game of telephone, with six individuals in each trial and four trials per candidate metaphor. With these, we can see how well the Explanatory Metaphors hold up in social interaction as they are used and shared. Finally, we conduct Usability Tests to observe how the metaphor is used by experts in communicating knowledge. This final step is vital in crafting Explanatory Metaphors that can be used by experts in their work as translators and communicators. At each stage of testing, we use our findings to winnow our selections and refine the Explanatory

Metaphors that remain. What results is detailed data about which Explanatory Metaphor works, what it does and why.

## The Winners: Effective Explanatory Metaphors For The Risk-Reward System And Addiction Treatment

Employing the research process outlined above, FrameWorks' research team identified, refined and empirically tested a total of 13 metaphor iterations for the risk-reward system and 11 metaphors for effective addiction treatment. From the first set, the *Reward Dial* emerged as the most effective tool, while *Redirecting The River* (originally titled *Rerouting The River*) emerged as the winner of the second set. Below, we describe the findings for each of the two winning Explanatory Metaphors. We conclude with discussions of how to use each Explanatory Metaphor and provide specific directions for their application.

### Reward Dial

#### What the *Reward Dial* Contributes to Public Understanding

The *Reward Dial* makes significant contributions to public understanding about what the risk-reward system is and how addiction relates to this system.

The strengths of the metaphor stem from these features:

- The brain can be thought of as a mechanical/electronic system.
- It has a subsystem that rewards us when we do certain activities.
- The system uses a set of dials to dynamically respond to external feedback and generate reward.
- The dials (or other parts of this system) can become loose, which changes how the system responds to stimuli — but these disconnections can be repaired over time.

Below, we review the development of this Explanatory Metaphor through the iterative research process. We discuss its general effects, summarize the empirical evidence that demonstrates its explanatory power, and describe the specific strategic advantages it confers when employed in communicating about the connection between the brain's risk-reward system and addiction.

#### I. General Effects

Each stage of research confirmed the effectiveness of the *Reward Dial* Explanatory Metaphor.



Useful parts of the metaphor include:

- A brain can be thought of as a mechanical or electronic system — like a stereo.
- Pleasure, the reward of doing something, is the sound that comes out of the stereo.
- The activities we engage in turn the reward dial up and down.
- When the dial is turned up too high too frequently, it can become loose, and the connection between the dial and the system that it controls gets weakened.
- When this happens, the dial can no longer reliably or predictably moderate the sound that comes out of the stereo.
- One consequence is that, over time, individuals have to turn up the dial higher and higher just to get a normal amount of volume.
- When this happens, the dial isn't broken, it's simply bent or loose.
- Over time, there are ways of reattaching and reconnecting the dial so that it regains the ability to properly adjust the volume.

The *Reward Dial* was effective in creating more robust and scientifically consonant ways of talking and thinking about addiction. It channeled thinking towards the sense that addictions share a number of characteristics, that there is an underlying brain basis for addiction, and that addiction is a treatable condition.

## II. Evidence from On-the-Street Interviews

FrameWorks' researchers conducted On-the-Street Interviews with 48 people in Calgary and surrounding areas. These interviews tested the ability of eight candidate metaphors to enable more articulate, and scientifically consonant, discussion about the risk-reward system and the role of this system in understanding addiction.

Informants were first asked a set of questions about how addiction happens, and were then presented with one of the candidate Explanatory Metaphors. After the metaphor was presented, they were asked the earlier questions but in a rephrased form. Two researchers independently analyzed the resulting video data, looking for patterned ways in which each of the Explanatory Metaphors changed thinking and talking about addiction. The analysis also focused on isolating the reasons *why* each of the metaphors tested had their respective effects.

Several of the metaphors had productive effects at this stage. Mechanistic metaphors (*Thermostat, ATM, Throttle, Reward Dial*) appeared particularly promising because people are familiar with the systems and the ways that they structure and connect inputs and outputs. However, researchers also noted that language in these metaphors about

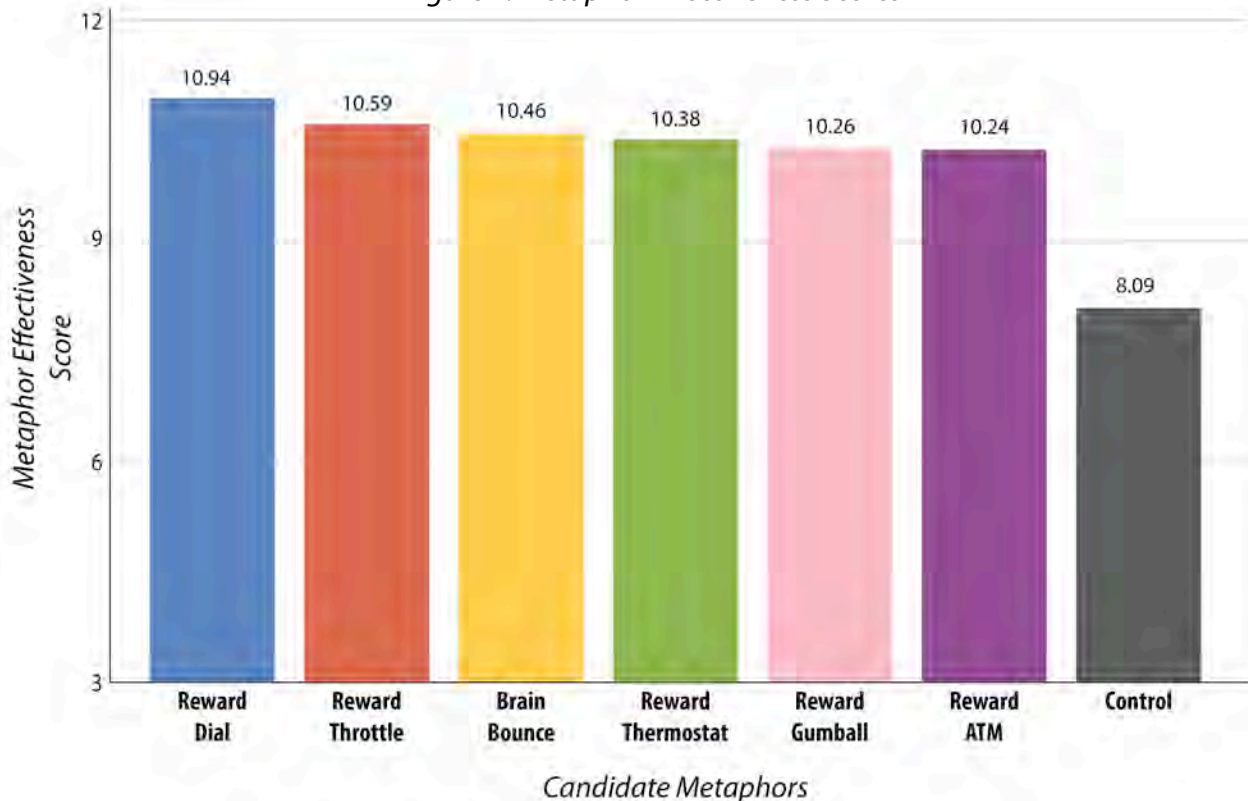
“cranking up the volume” was problematic because it led participants to the idea that addiction is a matter of addicts seeking pleasure in extreme degrees rather than a matter of diminishing returns from a compromised system. We adjusted the presentation of these mechanistic metaphors as well as others that showed promise, generated several new metaphors, and prepared a revised set candidates for the next research phase.

### III. Evidence from the Quantitative Experiment

Using the results from On-the-Street Interviews to winnow the set of candidate metaphors and refine existing iterations, FrameWorks designed a large-scale experimental survey to quantitatively assess the efficacy of the refined set of metaphor candidates. This test, a head-to-head comparison using random assignment techniques, enabled FrameWorks’ researchers to chart how well each Explanatory Metaphor achieved the goals that we described above. Six metaphors and one control condition were tested using the same set of questions. (Examples of these questions and more information about the experiment are provided in the Appendix.) Figure 1 summarizes the results of the experiment.

Of the six metaphors, *Reward Dial* achieved the highest score. The differences in the score of *Reward Dial* relative to all other metaphors tested (and the control condition) were statistically significant. Based on these results, FrameWorks’ researchers took *Reward Dial* into the final stage of metaphor testing — Persistence Trials.

Figure 1: Metaphor Effectiveness Scores



## IV. Evidence from Persistence Trials

FrameWorks held three Persistence Trials in Calgary, Alberta, with a total of 18 participants. Persistence Trials give participants a way to interact with, and use, the Explanatory Metaphor in actual social discourse. Persistence Trials therefore produce rich data about a given Explanatory Metaphor's properties and effects. In a Persistence Trial, an initial pair of participants is presented the Explanatory Metaphor, first as text and then conversationally by the researcher. The participants then discuss the Explanatory Metaphor with the moderator before teaching it to a subsequent pair of participants after being given a few minutes alone to plan a presentation. Following the transfer, the second pair explains the Explanatory Metaphor to a third pair. Finally, the first pair returns to hear the transmitted metaphor from the third pair. This last step allows us to see whether the metaphor has persisted over the session and to enlist participants in explaining any changes that may have occurred to the metaphor. With written consent from all participants, Persistence Trials are video-recorded from start to finish.

Data from Persistence Trials are analyzed along several lines: if and how participants can *apply* the Explanatory Metaphor; whether and how the metaphor *inoculates* against unproductive cultural models; the degree to which it is *communicable*; and whether and how the metaphor is able to *self-correct*. In these terms, the specific advantages of the *Reward Dial* are as follows:

### 1. Application

Persistence Trials showed that participants applied the *Reward Dial* metaphor to reach the following understandings about addiction:

***Addiction is located in the brain.*** Participants working with the metaphor placed some of the mechanisms involved in addiction firmly in the brain, repeatedly describing addiction as an issue involving “the wiring of the brain.”

*Participant:* It's not about only substance abuse, there's workaholics and it's all based on your — [pointing to head] — something is firing up there.

Another positive effect of the metaphor was how it moved people to understand the brain as the *active* agent in the seeking of pleasure, as opposed to the addicted person. In this sense, participants implied that the addicted brain acts against the interests of the person — a pattern that echoes experts' talk about addiction as resulting in impaired rationality and decision-making:

*Participant:* In an addicted brain, the reward dial gets disconnected from the reward center in the brain and the addicted brain is trying to turn the dial but it has no control. And so there is very little control over how people react to that self-

destructive behavior, if you are already addicted. The reward dial can be plugged back into the brain, but it takes time and it takes technical support.

**One of the brain's important functions is to regulate how we respond to pleasure and seek reward.** The *Reward Dial* helped people understand aspects of the brain's risk and reward system. The metaphor allowed people to think about what it means for a reward system to be functioning properly.

*Participant:* I think it's [the *Reward Dial*] connecting to dopamine, because dopamine is the pleasure chemical, so people feel pleasure when dopamine is released and they're seeking activities that release that amount of dopamine, whether naturally or chemically.

**Addiction is disequilibrium of the system.** The metaphor helped people understand that addiction is about the disequilibrium of the brain's reward system. After being exposed to the metaphor, participants reasoned that addiction involves the brain not being able to properly regulate pleasurable responses to rewarding activities. Participants explained that this disconnection alters the way that the brain responds to experiences, and that this mechanism is key to explaining addiction.

*Participant:* So people drink to get pleasure and the pleasure is the reward of drinking or gambling or doing drugs or anything bad ... overeating, sex, whatever it is. And when people get addicted, the concept of pleasure is no longer equal to what they get. This concept is called the reward dial. The same way that on the stereo you turn it up to three and it gets louder, you turn it up to a four or five and it's still loud. Doing your addictive behavior is like changing that dial, with the result being if you turn it up from a three to a five you apparently get less pleasure than a non-addicted person. In an addictive person, a person who is addicted, they wouldn't get the same amount. They would turn the dial up but not get the right amount. It does not work, so therefore the dial we speak of is out of whack to what exactly comes out in terms of pleasure. So the thing to do is to somehow get that dial recalibrated.

—  
*Participant:* So the idea is, with some self-destructive behaviors, that some people have control of them and some people don't. And the people who don't have control of those self-destructive behaviors, it's because their reward dial is not plugged in. So doing these behaviors to try and get a reward and sometimes the dial goes to 10 and sometimes the dial goes to zero, but they have no way of controlling that or knowing what the result is going to be from the behavior. So they keep trying the dial to make it work, whereas in the non-addicted brain we can kind of dial back and forth as we need to.

Participants discussed how this disequilibrium affects individuals in different ways, based on an individual's particular circumstances, their genetics and other factors. Here, another participant recognizes how underlying factors create different outcomes for people with the same experiences with substances.

*Participant:* Addiction is more than just one factor, so when it's all those factors, and when you have that disconnect, then it becomes the addiction. We can all use alcohol recreationally but not have the addiction issue, but when that disconnect occurs, that's when it happens.

**Addictions can be effectively treated.** Another major asset of the metaphor was the way in which it structured an understanding that the system, or, in the case of the metaphor, the dial, could be repaired, "reattached" or "reconnected" such that the system could eventually regain its ability to dial-in pleasure and rewards and be responsive to experience. In short, the metaphor led informants to the idea that addiction, and the systems that underlie addiction, could be treated and, over time, addressed.

*Participant:* This is a new idea because I haven't thought about how science could help reconnect those neurons and connectors before, so it was a new idea.

—  
*Participant:* The addicted brain is essentially out of whack and the reward dial needs to be plugged back in. But the reward dial *can* be plugged back in, but it takes time and it takes support.

**Addictions can be prevented.** Several participants mentioned the importance of learning more about *how* the risk-reward system can become uncalibrated or disconnected. They emphasized the fact that, if we could know more about ways in which the dial becomes loose or disconnected and loses its ability to control the volume, there might be ways of intervening to prevent addictions before they occurred. Armed with the metaphor, these informants seemed to believe that monitoring and risk assessment, rather than simply abstinence-oriented approaches, would help to minimize instances of addiction:

*Participant:* The ads on TV saying you shouldn't do this aren't going to help people.

*Moderator:* Why not?

*Participant:* Because it means nothing to them. According to this, people are wired differently so just saying "you shouldn't do this" is not going to work. According to this idea, they need more than just words saying "don't do this," because they don't even know they are not getting rewarded. So I think it needs to be brought to them this way. It's [the metaphor] more of an

understanding of how they are wired rather than just saying “don’t do this, what you are doing is wrong, can’t you see the effects of it?” No, they can’t!

## **2. Inoculation**

The *Reward Dial* also showed an ability to inoculate against several powerful default cultural models that lead people in unproductive directions when thinking and talking about the brain and addiction.

**Against stigma, toward treatment.** The *Reward Dial* provoked discussions in which people expressed the notion that “reconnecting” the *Reward Dial* was possible; indeed, no one in our sample exposed to the metaphor expressed the view that people with addictions were not treatable.

**Against each and every addiction is unique.** One benefit of the *Reward Dial* is that it provides a way of thinking about the common processes that underly addictions. When asked about what causes addictions without the aid of a metaphor, people quickly become lost either classifying addictive substances or bringing up activities which they are convinced are also addictive (such as shopping or exercise). This tendency to enumerate examples distracts from the fundamental cognitive task of understanding how these examples relate to the foundational science of addiction. The quotes below, from two different Persistence Trial sessions, illustrate the ability of the *Reward Dial* to help people understand the underlying process that is common among addictions.

*Participant:* That’s why I looked at this [pointing to an illustration of the metaphor on a pad of paper], because it’s anything. It could be any addiction.

—  
*Participant:* What their presentation touched on was the physiological and the wiring of your brain and I think that’s one of several reasons why people become addicted. Peer pressure. Emotional issues.

## **3. Communicability**

Communicability refers to the faithfulness of the transmission of the Explanatory Metaphor among participants. Analyzing video of Persistence Trials, FrameWorks’ researchers look for the repetition of exact language and key ideas, as well as the stability of the central metaphor as it is passed between individuals. Communicability varies significantly among the Explanatory Metaphors that we test, making it an important metric in gauging the effectiveness of any one Explanatory Metaphor.

Throughout the research process, we observed people talking about dials, knobs and stereos as well as qualities of the resulting sound (such as volume), and using this language and these concepts to explain addiction to other research participants. In

short, the metaphor was highly “sticky” and communicable. The fact that the expressions “wiring of the brain” and “hardwired” are so frequent in English also contributes to the communicability of this metaphor.

Another characteristic of a metaphor with a high degree of communicability is that, when participants use it or talk about it, they make gestures with their hands and fingers.<sup>11</sup> In the case of the *Reward Dial*, we observed participants in both On-the-Streets Interviews and Persistence Trials making a dial-turning gesture with their fingers. When such gestures accompany a particular metaphor, they indicate that the metaphor has been powerfully incorporated into deep parts of cognition and meaning-making — in short, from a cognitive perspective, such gestures indicate that the metaphor has a high degree of “thinkability.”

#### **4. Self-correction**

Self-correction refers to an Explanatory Metaphor’s ability to “snap back” to its initial form following a deterioration or mutation of the concept in discussion. At times, one structural feature of the metaphor may be forgotten, drop out of conversation or devolve into an alternative formulation. An important measure of an Explanatory Metaphor’s strength, self-correction occurs when these features fall out of conversation and then re-assert themselves in subsequent discourse *without being re-cued by the moderator*. When communicated in the public sphere, Explanatory Metaphors are likely to break down. Therefore, it is important that a concept have sufficient internal coherence to recover from devolutions — to encourage people to arrive at key entailments despite partial or inaccurate communication of the Explanatory Metaphor.

Given how highly communicable this metaphor was, there were limited opportunities for researchers to observe its self-correctional attributes. In other words, observing self-correction requires a degree of metaphor breakdown that the *Reward Dial*, happily, did not experience.

## **V. Evidence from Usability Tests**

The final method involved putting *Reward Dial* into the hands of addiction and general health professionals by asking them to use the metaphors in a short presentation. The purpose of Usability Tests is not only to validate the usability of the metaphor, but also to observe *how* it is usable: What sorts of questions does the metaphor help experts answer? Can they discover aspects of the metaphor that researchers may have overlooked? Does it give experts the resources they need to communicate important ideas? How could the metaphor be improved to make it more powerful in its explanatory effects and more usable by communicators?



During a typical Usability Test, two experts are presented with a metaphor by a FrameWorks researcher. After time for discussion and preparation, the experts are asked to use the metaphor to present a concept to two audience members (either members of the general public or a second pair of experts). Following the presentation, audience members are encouraged to ask the presenting experts questions about their presentation and the presenting experts are given the opportunity to address these questions. The audience members then 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?

FrameWorks researchers conducted a total of four Usability Tests on *Reward Dial* in May, 2014: two 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.<sup>12</sup> With participants' permission, all sessions were video recorded and transcribed for analysis.

Experts used *Reward Dial* to communicate a set of key principles about the science of addiction. Most importantly, they used the metaphor to anchor talk about addiction in the brain and its functioning. They 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 emphasized that addiction is not failure of self-discipline or willpower, but a brain-based phenomenon. Although communicating the elements of high-quality addiction treatment was not one of its primary tasks, experts were also able to extend the metaphor to encourage richer discussions of ways to address addiction. For example, one group of experts talked about 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. A second group introduced the idea of dial “maintenance” in order to discuss the idea that treatment is an ongoing and long-term process.

## Redirecting the River

### What *Redirecting The River* Contributes to the Public Understanding

A second metaphor, *Redirecting The River*, was developed to broaden people's understanding of the features of high-quality and effective addiction treatment. As noted above, while the metaphor was tested prior to the June 2013 Alberta floods, these events

are likely to have heightened the salience of this metaphor for Albertans, and to amplify the productive effects described below.

The strengths of this metaphor stem from the following features of the metaphor domain:

- River systems are very familiar to Albertans.
- There are multiple ways to think about the ways that rivers change — these include changing the course of a river, change in the geography of the river, changes in the flow of the river, or changes that occur as people navigate the river.
- Thinking of life as a journey or a path is highly salient and, in this case, helps in translating expert perspectives on the features of effective addiction treatment.
- A river is a dynamic system — it is expected to change and to do so frequently.
- A river may be linear, but it is also cyclical.

Below, we review the development of this Explanatory Metaphor through the iterative research process. We discuss its general effects, summarize the empirical evidence that demonstrates its explanatory power, and describe the specific strategic advantages it confers when employed in communicating about effective addiction treatment.

## **I. General Effects**

The metaphor's effectiveness and strength as a translation tool were confirmed at each stage of the research process. Central components of the metaphor include:

- Addiction is a river.
- It forms over time and in response to a number of different forces and factors.
- The course of a river can be altered, but this takes time and resources.
- Changing the course of a river involves the sustained effort of a team of people.
- The earlier this work begins, the easier it is and the better the outcome will be.

*Redirecting The River* was effective in activating and invigorating the sense that addictions are treatable, and that there is a common set of features that underly effective treatment approaches. The recognition of these common features helped people see the importance of, and think more positively about, designing an infrastructure that can help an entire population of people, shifting focus away from the idea that increasing the willpower of isolated individuals is the only way to deal with addiction.

## II. Evidence from On-the-Street Interviews

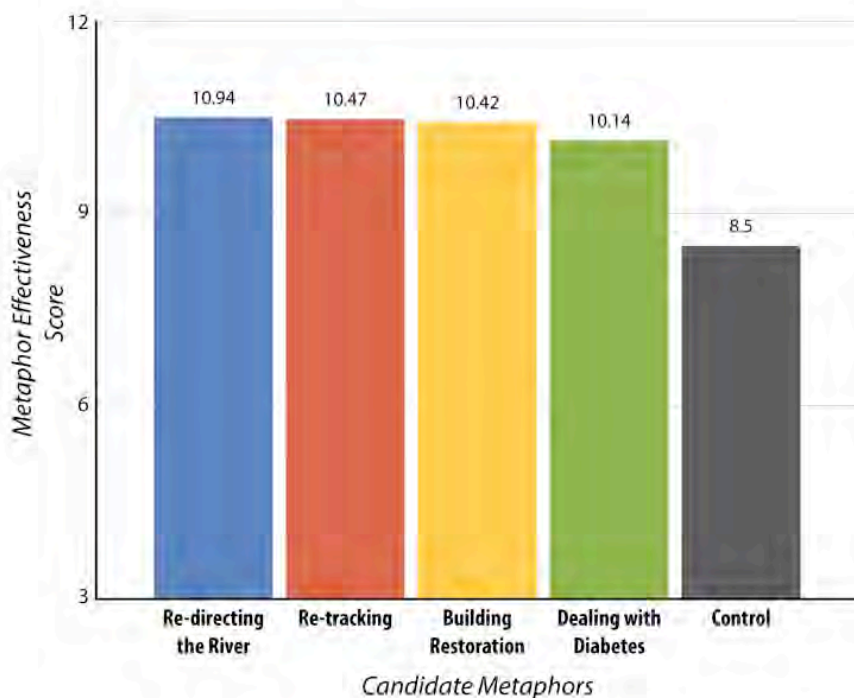
FrameWorks' researchers conducted On-the-Street Interviews with 36 people in and around the Calgary area. These interviews followed the same method and analysis protocols as those described above.

In these interviews, we found that the river domain was easy for Albertans to talk about. The benefits of early intervention were sticky, and it eliminated willpower almost entirely from people's storytelling about real or hypothetical situations of addiction. These results were used to winnow and refine the set of candidate metaphors for the next research phase.

## III. Evidence from the Quantitative Experiment

FrameWorks also designed a large-scale experimental survey to quantitatively assess the efficacy of the refined set of metaphor candidates for effective addiction treatment. Four metaphors and one control condition were tested against a set of knowledge and understanding questions. (Examples of these questions and more information about the experiment are provided in the Appendix.) Figure 2 summarizes the results of the experiment. The difference between the top-scoring metaphor, *Redirecting The River*, and the control was statistically significant. Based on its quantitative score and strength in On-the-Street interviews, researchers took *Redirecting The River* into Persistence Trials.

Figure 2: Overall Effectiveness



## IV. Evidence from Persistence Trials

FrameWorks held three Persistence Trials in Calgary, Alberta, with a total of 18 participants. The sessions were conducted and data analyzed in the same manner as described above. Analysis identified the following strengths of the *Redirecting The River* Explanatory Metaphor as a tool for translating perspectives on effective addiction treatment:

### 1. Application

Persistence Trials showed that participants exposed to the *Redirecting The River* metaphor came to understand the following features of addiction and addiction treatment:

**Addiction is treatable.** Discussions showed, both explicitly and implicitly that, after being exposed to *Redirecting The River*, participants viewed addiction as treatable. While many people referenced the difficulties involved in addressing this “complex” phenomenon, no one expressed the opinion that people with addictions should not be treated, or that addiction treatment was hopeless or impossible. In short, the metaphor channels people’s attention towards addressing addiction and notions that addictions *can* be treated, and away from deterministic notions that there is ultimately nothing that can be done. The following interaction between two participants illustrates this focus and shows the implicit assumption that is being made about the fact that addictions are addressable.

*Participant 1:* There needs to be an earth mover and a specialist to help us clear this away because it’s narrowing and the fish is now out of the water, and everything is brown. We’re going to try to get to this bridge here. We’re going to try to get to this bridge here, once we get to that bridge, with the help of specialists, then —

*Participant 2:* Then the river opens up again and it’s a very long river, very wide river. And they float through the river until you hopefully get to a stage in their life when you can treat their addiction and then they can go back into the community.

**Overcoming addiction takes time and sustained effort.** The metaphor led participants to focus on the time and sustained effort that is involved in effective addiction treatment — coming to the realization that addictions are treatable, but that there are no quick fixes for effectively addressing these conditions. These discussions included, for example, the resources necessary to actually move a riverbed or redirect the flow of a river, and the time involved in finding a safer, open course to navigate. Moreover, participants used these aspects of the metaphor to tell stories about the process of addiction treatment, as in the following example:

*Participant:* For example, she was addicted to alcohol and they were trying to do harm-reduction in the community but it wasn't working, so their channels were rerouting to another river which wasn't helping, then they get into a community group where they were able to seek assistance, and while they were going up and down the rocks, they were able to find the right river to channel them through.

**Addiction treatment involves a team of professionals and a multi-modal approach.** One of the most frequent and powerful effects of the metaphor was the way that it led participants to focus their discussions of effective treatment on the importance of having access to *groups* of professionals (or “a team of professionals,” as participants frequently said) who specialized in different types of, and approaches to, treatment.

*Participant:* Good addiction treatment ought to start with some professional help or support. But I think you need a multi-pronged approach, in the sense that you can't have one treatment and let the person continue on in their day-to-day life. There has to be a complete change of direction. But it can't be as simple as saying, “Okay, you're going to change your habits.” There has to be *professional* help and support, there needs to be accountability and checking in. Potentially medication, counseling. It has to be a whole bunch of different things.

—  
*Participant:* From what I know, the addiction treatment and mental health treatment programs are almost intertwined. It's hard to separate the two — I know there's a mental health arm of the AHS, but specific treatment programs, for alcohol, gambling. As for the course of the river in Alberta, I'm thinking there's probably not enough professionals to help all the people in Alberta, and I see so many people on the street, and lot of them have addiction problems wrapped in mental health problems.

One way that Explanatory Metaphors function is to provide people the opportunity to fill in cognitive holes — that is, these communications tools help people understand an aspect of an issue on which they have no model from which to reason. *Redirecting The River* does this by noting the necessity of a team approach without specifying the members of that team, thus allowing people to “name” and fill-in the professionals and specialists who contribute to effective addiction treatment. The following quote, explaining an illustration created by Persistence Trial participants, shows how the idea that redirecting a river requires a team of specialists led people to flesh out the different functions and approaches that are needed for effective treatment:

*Participant:* There's a nurse representing a medical intervention, then there's a construction worker representing an overall authority that helps to redirect the

flow of one's life and a person here with a clerical collar representing the spiritual aspect that's needed. So there's a three-pronged approach.

**Early intervention is better.** The metaphor also helped people realize and think productively about the importance of *early* intervention as a feature of effective treatment. This was a sticky feature of this metaphor, with people drawing from their knowledge of geology as they talked about how it is easier to make changes earlier rather than later, as in this quote:

*Participant:* If you're into the grand canyon, it's hard to make those changes because there are so many layers and it's so engrained. So how to change that? What equipment do we need? Well one way would have been by changing it earlier, say at the Elbow River, how does it change things? Is it easier? Is it harder? At what point is it harder to make those changes?

This attention to early intervention also made it possible for people to critique current provincial efforts:

*Participant:* One of the things I have noticed and perhaps it's my interpretation of the analogy here, but I don't see that we have a means of readily identifying people with addiction problems. Perhaps one of the things that the province could be doing is better identifying who is at risk.

## **2. Inoculation**

*Redirecting The River* also inoculated against several powerful default cultural models that lead people in unproductive directions when thinking and talking about addiction.

**Against stigma.** Participants using *Redirecting The River* did not talk about addiction in terms that stigmatized addicts — which previous FrameWorks research has shown to be a dominant way in which Albertans discuss addiction.<sup>13</sup> Instead, when they told the stories of addicts, participants exposed to the metaphor focused not on the supposed moral failures of the addict, but on identifying effective means to help the person by treating the addiction.

*Participant:* You have to have the tools. And that's a part of good treatment: You have to know where it's coming from, you have to know when you get to the rough spot, what sort of toolkit have you got. It's about empowering people and giving them a certain kind of toolkit, so when you're on the rapids you know what you're doing. Otherwise you go back to the same behavior, if you don't have something readily available.



**Against individualizing addiction.** Participants were often observed balancing the notion of common features of effective treatment provided by the metaphor against their sense that treating an addiction involves delving into the emotional particulars of each individual's biography. The *Redirecting The River* metaphor pushed people to see that part of the complexity of addiction was that effective treatment involved *both* perspectives — requiring a set of common treatment features *and* a consideration of the specific circumstances of an individual's addiction. The ability of the metaphor to help people achieve this productive balance between common processes and personalization of treatment is a major strength of the metaphor. This was exemplified in the following:

*Participant 1:* Are we talking about any type, form, kind of addiction or addictive behavior?

*Participant 2:* General addiction. Covering them all.

*Participant 1:* That's a wide spectrum of addiction.

*Participant 2:* A lot of the treatment is good for all the way across, then it would get specified, it would break into specific [treatments].

**Against willpower.** Implicit in many of the quotes provided here is the notion that individual willpower is not the major determinant of successful addiction treatment. No one stated this as explicitly as “a river can't redirect itself,” but participants came close in several instances, including this one:

*Participant:* At this point they're up the creek without a paddle. There's going to be all the kinds of psychological and social assistance and the more medical kind of assistance, all of those pieces have to be in place. You can't do it on your own. You have to participate, you have to be involved, but you can't do it yourself. So you need the people and the tools.

The willpower model is the dominant way that Albertans think about addiction and addiction treatment. The ability of the metaphor to channel people's attention away from the myopic focus on “wanting to quit” is a highly promising finding for those communicating about the science and effective treatment of addiction.



Figure 3: A group's instructional drawing of the *Redirecting The River* metaphor



**Against determinism.** Perhaps the most powerful inoculative function of the metaphor was its ability to deeply and completely divert people’s attention away from strong default Albertan notions that “There really isn’t anything you can do once a person is addicted.” After exposure to the metaphor, researchers observed *no* instances in which participants discussed addiction or addiction treatment using the *There’s nothing you can do* cultural model — even though this model has been found in earlier work to be a powerful way that Albertans, unaided by reframing tools, think about addiction and treatment.<sup>14</sup>

### **3. Communicability**

*Redirecting The River* was sticky and easily passed between pairs, as exemplified in the following comments:

*Participant:* It’s an analogy for somebody’s life, a path, and there’s ups and downs. There are bridges that help them get back to the state where they can have a fighting chance.

—  
*Participant:* The key point is that there is a natural flow that needs to be redirected and that blockage represents the addiction itself. There needs to be a redirection of that flow or energy in order to result in successful treatment.

As further evidence of its communicability, participants frequently depicted the metaphor pictorially as they passed it to other participants. Researchers observed participants producing elaborate drawings of river systems and using these drawings to talk about key features and dynamics of effective addiction treatment.

### **4. Self-correction**

There were several instances in which Persistence Trials afforded researchers the opportunity to observe the metaphor’s ability to self-correct. By self-correction, we mean a metaphor’s capacity to recover when one or more of its conceptual components either drops out of conversation or morphs in meaning. For example, if the notion that it takes a team of skilled professionals to reroute a river fell out of one group’s discussion or presentation, researchers would look at the ability of this part of the metaphor to reintroduce itself in the discussions of subsequent groups.

Most of the examples of self-correction involved instances where group discussion moved from ideas of *rerouting* the river to *navigating* the river. In the several instances in which this occurred, the notion of the work and process required to reroute a river reinserted itself into group conversation without moderator probing. As the construction-based idea of rerouting the river was central to the conceptual functioning

of the metaphor, demonstration of its ability to self-correct in this way was important to observe.

## V. Evidence from Usability Tests

FrameWorks conducted three Usability Tests on *Redirecting the River* in Calgary and Edmonton in May, 2014: 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.<sup>15</sup>

The metaphor enabled experts to make a number of key points about the science of effective addiction treatment. Most importantly, experts used the metaphor to “add back in” the contextual considerations that are often absent from Albertans’ default understanding of addiction and addiction treatment (for example, by noting that a river “can’t redirect itself”). Experts also described how, just as redirecting or rechanneling a river requires the contributions of scientists, engineers, cartographers and others, effective addiction services are *multi-modal* — that is, they involve the combined efforts of psychiatrists, therapists, family physicians and vocational counselors, as well as family and community members. Lastly, experts used the idea that redirecting a river is easier when the river bed is “shallow” to explain that addiction treatment is most effective when it begins *early* in the trajectory of an addiction.

## Using The Reward Dial And Redirecting The River

For the reasons described above, FrameWorks confidently offers *Reward Dial* and *Redirecting The River* as two new strategic frame elements to aid in reframing the public conversation about the causes of addiction and the features of effective addiction treatment, respectively.

We add a note of caution, however, in the application of Explanatory Metaphors in general and of the metaphors offered here more specifically. The Explanatory Metaphors suggested here were tested both for their underlying concepts and with respect to the highly targeted linguistic execution of the core set of concepts. They are not meant to be reduced to labels but rather to be explicated in such a way that the core concepts, mapping one thing onto another, are able to take hold. This requires a more extensive explanation if the Explanatory Metaphor is to achieve its ability to introduce, as one participant noted, “a new idea.” We have thus provided some guidelines that users of these metaphors are invited to apply to their creative adaptation of this communications tool.

## Reward Dial

Here is an example of the 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.*

The following are specific recommendations for using the metaphor:

### **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. **Be sure to clarify that the setting of the reward dial changes.** Some people had difficulty with the notion that the reward dial is turned up and down at different times. We speculated that this has to do with the fact that volume controls and power switches are separated on modern electronics devices, meaning that volume controls are infrequently adjusted. We therefore recommend that communicators using the metaphor explicitly discuss the fact that a key feature of the *Reward Dial* is its responsiveness — its ability to cause a change in volume/reward based on manipulation/experiences.
  3. **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.
  4. **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.
  5. **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 in Usability Tests 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.”
  6. **Emphasize that treatment is possible.** Communicators 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.
  7. **Avoid the word “control.”** One might have expected that a metaphor implicitly talking about “control” over a mechanical system would have activated the *Willpower* cultural

model and precipitated unproductive discussion about how individuals “choose” to become addicted. *This was not observed in the research.* However, as a safety precaution, we recommend that communicators use the word “regulate” or “calibrate” instead of “control,” as an additional linguistic step in avoiding the activation of the unproductive *Willpower* model.

**8. Avoid the word “broken.”** It is imperative *not* to characterize the dial and the stereo as “broken,” for fear of cuing the deterministic understandings of addiction (that it is an unsolvable problem) that previous research has shown are dominant in Alberta.<sup>16</sup> The colloquial observation frequently offered by Albertans was that the dial was “out of whack.”

**9. Embed the metaphor in a larger story about brain development and addiction.** *Reward Dial* is highly compatible with other tools that FrameWorks has developed and tested in Alberta to translate the science of brain development. *Toxic Stress* can be discussed as a factor that can cause the *Reward Dial* to become disconnected, affecting the system’s capacity to respond appropriately to experiences. The *Outcomes Scale* metaphor — a tool that helps people understand developmental outcomes and individual differences — can be used to explain the process by which environmental factors can disconnect the *Reward Dial*. *Brain Architecture* has the potential to explain how the *Reward Dial* develops and comes on line, and how perturbations in this process affect the system and its functions. Furthermore, the value of *Ingenuity*, which has proven effective in reframing addiction programs and policies in Alberta, has a productive synergy with the *Reward Dial*. *Ingenuity* can be used in crafting messages about the importance of thinking innovatively about interventions that can assist in the gradual recalibration of the *Reward Dial*.

## Redirecting the River

This is an example of the metaphor for addiction treatment:

*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.*

The following are specific recommendations for effectively using the metaphor:

**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 flooding. When appropriate, we encourage communicators to connect these understandings to the communicative goals of the metaphor. For example, communicators 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. 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.
- 5. 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, communicators might talk about “intervening upstream” to interrupt the factors that “feed” a river and contribute to its carving a deeper and deeper channel.
- 6. Draw a river, and illustrate the redirection of the river’s course.** As observed in the Persistence Trials, people engaged themselves in elaborate drawings of rivers, including waves, rocks, animals, humans, bridges and pipes. These drawings were found to assist others in understanding key features of successful treatment. The metaphor is highly visual; communicators should leverage this strength of the metaphor and design visuals that aid people’s thinking about the features of effective treatment.
- 7. Embrace the associations.** In Persistence Trials, participants enthusiastically extended the metaphor in a number of novel directions, namely towards navigation and experiences of being on a river. These extensions were found not to undermine the effectiveness of the redirection metaphor. *However*, we would counsel that users not cue those other domains in visual depictions and should avoid depicting boats or other vehicles, and humans in or beside the river, in case these explicit navigational components take over and crowd out the more construction-based notion that the translational effectiveness of the *Redirecting The River* relies on.
- 8. Tell a story.** We also saw in both Usability Tests and Persistence Trials how easily and effectively the metaphor lends itself to structuring narratives about effective treatment, and how narratives structured by the metaphor were fundamentally different from the types of stories people tell about addiction when not primed with the metaphor. These default stories are dominated by themes of *Willpower* and stereotypical images of addicts as social outcasts (i.e., homeless). Given that the metaphor was so frequently and productively used by participants to tell stories, we suggest that communicators use the metaphor to create narratives about effective treatment and illustrate how this treatment affects outcomes at a public health and population level.
- 9. Travelers don’t have negative associations.** We would have anticipated that making the person with an addiction into a traveler would have cued the *Willpower* cultural model. Despite this hypothesis and concern, the metaphor proved highly effective in helping people talk about addicts but focusing their attention on the features of

treatment that lead to improved outcomes. The fact that the fate of the individual on the river is understood to be centrally affected by the river (i.e., that there are things *outside* of individual control), allowed the metaphor to simultaneously hold individual (the addict) and structural (the treatment program or intervention) levels productively in mind. This suggests that addicts have a productive place in the metaphor as travelers on the river, and that communicators can invoke this role when using the metaphor to frame discussions of high-quality and effective addiction treatment. This recommendation draws on the metaphor's power to inoculate against the *Willpower* cultural model.

**10. Use the metaphor with other framing tools that have proven effective.**

FrameWorks' previous research has shown several values to be effective in helping Albertans think more productively about addiction. These fit well with *Redirecting The River*, can buttress the explanatory effects of the metaphor, and can provide a productive orientation to conversations about addiction treatment. The value of *Prevention* can be helpful in amplifying the metaphor's effect in helping people see the importance of treatment that occurs *early* in the addiction trajectory. In addition, the value of *Interdependence* can assist communicators in emphasizing the importance of community and a team of professionals in providing successful treatments — all ideas facilitated by the metaphor.



## APPENDIX: The Methodological Approach To Identifying And Testing Explanatory Metaphors

### Phase 1: Mapping The Gaps

In the first phase of this Explanatory Metaphor 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 Albertans understand addiction and addiction treatment.

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 on addiction. FrameWorks calls this process “mapping the gaps.”

### Phase 2: Designing Explanatory Metaphors

After identifying the gaps in understanding, the second phase of the Explanatory Metaphors research process aimed to generate a set of candidate Explanatory Metaphors that were then empirically explored and tested in the third research phase. The result of the design process is a list of both metaphorical categories (e.g., *Structures*), and multiple iterations, or “executions,” of each category (e.g., *Platforms*). 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 Explanatory Metaphor categories, which examines the *expected* public response to the metaphors, based on cultural models theory and existing FrameWorks research on cultural models that Albertans employ in understanding addiction and addiction treatment. 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 metaphors found to be damaging or distracting in the public’s thinking about the topic are eliminated

from the candidate list. On the other hand, Explanatory Metaphor categories containing elements of more-productive cultural models are highlighted as particularly promising.

During the process of designing candidate Explanatory Metaphors, FrameWorks also assesses the metaphors' abilities to be incorporated into practice by journalists and advocates/practitioners. In some cases, this practical assessment has suggested that some candidate metaphors are too provocative or problematic to pass into the public discourse. These metaphors 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.

### **Phase 3: Testing Explanatory Metaphors — Three Tests of Metaphor Effectiveness**

#### *Test 1: On-the-Street Interviews*

As the initial opportunity to test candidate Explanatory Metaphors, On-the-Street Interviews present an ideal opportunity to gather empirical data on the effectiveness of candidate Explanatory Metaphors: which specific elements of the metaphors 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: risk-reward system (*Brain's GPS System, Brain-o-Stat, Brain Volume, Reward ATM, Brain Pedal, Stuck in the Snow and Brain Gates*) and addiction treatment (*Bridges To Recovery, Building Restoration, Bad Backs, Dealing With Diabetes, From Ruts to Roads and Rerouting The River*).

In 2012, FrameWorks tested these 14 candidate Explanatory Metaphors in two sites in Calgary. Each candidate Explanatory Metaphor was presented orally, in separate interviews, to six informants in each location for a total of six interviews per metaphor, comprising a data set of 84 ten-minute interviews. All informants signed written consent and release forms, and interviews were video- and audio-recorded by a professional videographer. 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 84 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 Explanatory Metaphors tested in these interviews, we recognize the importance of between-group variation and take up this interest in quantitative testing of Explanatory Metaphors. 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 Explanatory Metaphors; (2) refine those metaphors with more mixed results; and (3) eliminate highly problematic metaphors, 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 conservative, to assure that only the most unproductive metaphors are eliminated.

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

- A. Did the informants *understand* the Explanatory Metaphor?
- B. Did they *apply* the Explanatory Metaphor to talk about addiction and addiction treatment?
- C. Did the Explanatory Metaphor *shift* discussions away from the dominant thought patterns that characterized the initial responses?
- D. How did informants respond to the questions about what the province of Alberta could be doing better?
- E. Did exposure to the Explanatory Metaphor *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 Explanatory Metaphors to an online quantitative experiment. The overarching goal of this experiment was to gather statistically meaningful data on the metaphors' effectiveness, which provided an empirical basis for selecting one or two metaphors 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 Explanatory Metaphor that was then taken into the final stage of the empirical testing process. The metaphors that emerged as successful in On-the-Street Interviews were built out to include other iterations.

In March 2013, FrameWorks conducted the survey, which measured the performance of 10 candidate Explanatory Metaphors in the two issue areas in relation to a set of outcome measures. Twenty-four hundred survey participants were included and data were weighted on the basis of gender, age, race, education and party identification to ensure that the sample was provincially representative.

### ***Experimental Design***

Following exposure to one of the “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 included *understanding* and *application*.

### ***Treatments***

In total, 10 specific Explanatory Metaphor iterations were tested in this survey, six for explaining dopamine risk-reward (*Reward Thermostat*, *Brain Bounce*, *Reward Throttle*, *Reward ATM*, *Reward Gumball*, *Reward Dial*) and four describing treatment (*Building Restoration*, *Dealing With Diabetes*, *Rerouting The River*, *Re-tracking*). Each set was also accompanied by a control, in which participants were asked to think about addiction for ten seconds. Each treatment consisted of a paragraph that described the metaphor, as in the following example for *Reward Thermostat* (which performed poorly on the survey):

There is a system in our brains that rewards and motivates us. Under normal circumstances, it helps us remain happy and functional. This is the brain's reward thermostat — a desired temperature gets set, and the furnace works to get the house to that temperature. However, in an addicted brain, the thermostat loses its connection to the furnace because it's been cranked too far up way too often. As a result, the temperature in the house is always too high or too low.

People often think that addiction is the desire for more heat, but it's really the loss of the ability to regulate the temperature. Reconnecting the reward thermostat to the furnace is difficult. But it can be done over time and with the right kinds of technical support.

Within each set of metaphors, the only differences were the name of the Explanatory Metaphor (e.g., *Reward Thermostat*), structural features specific to that metaphor, and appropriate lexical items or phrases. This balance of *variation* between metaphors and *standardization* in construction and language is designed to ensure that any differences in effect were due to differences among the metaphors themselves, and not to some unintended confounding variable.

### **Outcome Measures**

After receiving the treatment paragraph, participants were asked 26 multiple-choice questions to test each metaphor's performance. The numerical outcomes of this experiment were provided in the main body of this report.

Respondents were asked questions such as:

*The reward system in the brain ...*

- A. Tells us when certain experiences or activities are pleasurable.
- B. Shouldn't be trusted much, because it misleads us.
- C. Works in different ways for different people.

What does the <insert metaphor name> explanation suggest about an addicted brain?

- A. That it can be changed, given enough time.
- B. That it's damaged and can't be changed.
- C. That it's hyper-flexible and changes easily.

According to the <insert metaphor name> explanation, which of the following is the best definition of addiction?

- A. Addiction is the result of a change to the reward system in the brain.
- B. Addiction is an issue over which people have control.
- C. Addiction is a result of the chemical properties of certain drugs.

### **Open-Ended Questions**

One goal of the Explanatory Metaphor testing process is to discover the minimally effective linguistic unit that produces the largest cognitive change, as measured in discourse. In this project, we endeavored both in On-the-Street Interviews and in the quantitative experiment to check people's immediate reactions after they were given the most basic

formulation of the metaphor (e.g., that “the risk-reward system has an inherent bounce that isn’t present in addicted brains”). In this experiment, people were given three open-ended opportunities to react to the Explanatory Metaphor:

1. How much do you like or dislike <insert model title> as an explanation of addiction?
2. Please take some time to list the ways that you think addiction can be thought of as <insert model title>.
3. Now, please list any other thoughts that come to mind as you were thinking about the idea of <insert model title>.

### *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 Explanatory Metaphor to other participants with a reasonable degree of fidelity? and (2) *how* do participants transmit the Explanatory Metaphor? In other words, the method examines how well the Explanatory Metaphors hold up when being “passed” between individuals, and how participants use and incorporate the metaphors in explanation to other participants.

#### ***The Persistence Trial***

A Persistence Trial begins with two participants. The researcher presents one of the candidate Explanatory Metaphors and asks the two participants a series of open-ended questions designed to gauge their understanding of the Explanatory Metaphor and their ability to apply the model in discussing the target domain (here, how the pleasure system of the brain works). For example, the researcher asked how the participants understood the Explanatory Metaphor, then probed how well they could use it to explain how the risk-reward system works and what causes addiction. Questions and analysis were also designed to locate any terms or ideas in the execution of the Explanatory Metaphor 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 Explanatory Metaphor to another pair of participants (Generation 2). Generation 1 was given five minutes to design a way of presenting the Explanatory Metaphor, 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 Explanatory Metaphor 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. Generation 3 teaches the model to Generation 1 (without being told that Generation 1 is already familiar), and they are allowed to debrief with Generation 1 on the direction the metaphor has taken. The interviewer then reads the original paragraph-long iteration and asks questions about its transmissibility.

For the addiction research discussed here, FrameWorks tested the *Reward Dial* and *Redirecting The River* in Calgary, Alberta, in three sessions apiece. 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 36 informants participated in the six Persistence Trials held to test the two metaphors. 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 Explanatory Metaphor.

- A. Were participants able to *apply* the Explanatory Metaphor; and, more specifically, what were the ways in which they applied the model?
- B. Was the Explanatory Metaphor *communicable*? Were Generation 1, 2 and 3’s presentations of the Explanatory Metaphor faithful to the initial model presented by the interviewer? How did the groups’ presentation 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 Explanatory Metaphor *inoculate* against dominant default cultural models? That is, did it prevent discussions from falling back to the dominant unproductive cultural models? Furthermore, if one of these cultural models did become active,



could the Explanatory Metaphor prevent the discussion from veering narrowly in these perceptual directions?

- D. Did the Explanatory Metaphor *self-correct*? That is, if one Generation's presentation was not faithful to the original Explanatory Metaphor 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 Explanatory Metaphor?

As described in the main body of this document, *Reward Dial* and *Redirecting The River* produced a number of beneficial effects on participants' talk about addiction and addiction treatment.

#### *Test IV: Usability Tests*

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.

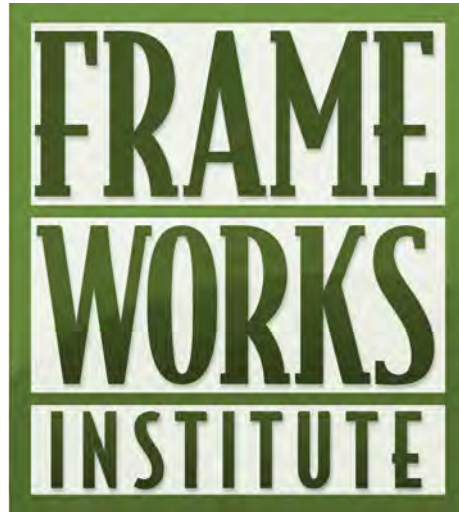
During a Usability Test, advocates, practitioners and experts who represent groups who might use the Explanatory Metaphor in their communicative practices are presented with the metaphor and asked to employ it in explaining their work. The goal of these tests is to observe *how* the metaphor is (and 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 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?

A total of 28 informants (consisting of both experts and members of the public) participated in the seven Usability Tests presented here. Members of the public were recruited using the same procedure as with Persistence Trials. Experts were recruited based on recommendations from Norlien Foundation staff.





## 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](http://www.frameworksinstitute.org).

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Please follow standard APA rules for citation, with FrameWorks Institute as publisher. Erard, M., & Kendall-Taylor, N. (2013). *Dials and rivers: Using Explanatory Metaphors to expand understanding of addiction and its treatment*. Washington, DC: FrameWorks Institute.

## Endnotes

- <sup>1</sup> For more about Strategic Frame Analysis™, see [www.frameworksinstitute.org/sfa.html](http://www.frameworksinstitute.org/sfa.html).
- <sup>2</sup> 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.
- <sup>3</sup> See: Lévi-Strauss, C. (1963). *Totemism*. Translated by Rodney Needham. Boston, MA: Beacon Press; and Lévi-Strauss, C. (1966). *The savage mind*. Chicago, IL: University of Chicago Press.
- <sup>4</sup> Erard, M. (2012). "Cracks in the brain": Enhancing Albertans' understanding of the developmental causes of addiction. Washington, DC: FrameWorks Institute; 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: A FrameWorks research report*. Washington, DC: FrameWorks Institute.
- <sup>5</sup> For an overview, see [www.frameworksinstitute.org/ezone8.html](http://www.frameworksinstitute.org/ezone8.html). For more on causal chains, see [www.frameworksinstitute.org/ezone31.html](http://www.frameworksinstitute.org/ezone31.html). For more on tone, see [www.frameworksinstitute.org/ezone17.html](http://www.frameworksinstitute.org/ezone17.html).
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- <sup>12</sup> For a full discussion of the results of these Usability Tests, please see: <http://frameworksinstitute.org/pubs/testingusability/>
- <sup>13</sup> O'Neil, M. (2010). *Between cowboys and barn raisers: The challenges of explaining child mental health and development in Alberta*. Washington, DC: FrameWorks Institute.
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<sup>15</sup> For a full discussion of the results of these Usability Tests, please see: <http://frameworksinstitute.org/pubs/testingusability/>

<sup>16</sup> Kendall-Taylor, N. (2010). *Rounding up the associations: How perceptions of addiction are recruited*. Washington, DC: FrameWorks Institute.