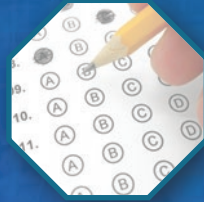
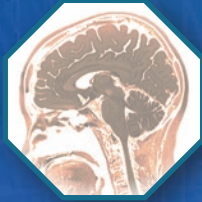
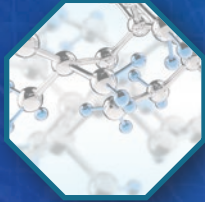


NATIONAL INSTITUTE OF MENTAL HEALTH



RDoC Changes to the Matrix (CMAT) Workgroup Update: Proposed Positive Valence Domain Revisions

May 17, 2018

*A Report by the National Advisory Mental Health Council Workgroup
on Changes to the Research Domain Criteria Matrix*



National Institute
of Mental Health

Department of Health and Human Services
Public Health Service
National Institutes of Health
National Institute of Mental Health



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Introduction

The National Institute of Mental Health (NIMH) launched the [Research Domain Criteria \(RDoC\)](#) in 2009 to implement a goal in its 2008 Strategic Plan calling for new ways of studying mental illnesses as organized around dimensions of observable behavioral and neurobiological measures. The project was motivated by the need to generate research designs for studying mental disorders that – compared to traditional symptom-based diagnostic categories – better align with rapidly-developing data from such areas as genomics, neural circuitry, and behavioral sciences. The RDoC framework is intended to foster studies that (1) integrate many levels of information (from genomics to self-report) to better understand the basic dimensions of functioning underlying the full range of human behavior (from normal to abnormal), and (2) incorporate neurodevelopment and environmental influences as critical aspects of studying these functions. NIMH envisions that the RDoC initiative will contribute to understanding how experimental classifications based on biology, behavior, and context can inform the science of mental illness and may inform revisions to future versions of psychiatric nosologies.

RDoC has progressed as a significant effort for the Institute, impacting basic, translational, and services/intervention research priorities, and was highlighted as a “cross-cutting” research theme in the 2015 Strategic Plan. A two-dimensional matrix comprises two important aspects of the current RDoC framework, domains of functioning and units of analysis. The rows are organized into Domains of functioning, reflecting contemporary knowledge about major systems of cognition, motivation, and social behavior. The initial five Domains are: Negative Valence Systems, Positive Valence Systems, Cognitive Systems, Systems for Social Processes, and Arousal/Regulatory Systems. Each Domain subsumes a set of related functional Constructs – concepts organizing data about a specified functional dimension of behavior, characterized in aggregate by its relevant genes, molecules, circuits, etc. Initially, a series of [workshops](#) was held in order to evaluate the research literature related to each of these five domains and define its constituent constructs on the basis of pertinent data (see [Appendix A: RDoC Matrix Domain, Constructs and Subconstruct Definitions](#)). The columns of the matrix specify Units of Analysis used to study the Constructs, and include genes, molecules, cells, circuits, physiology, behavior, and self-reports. Two other vital components of the RDoC research framework are neurodevelopment and environmental influences; inclusion of these aspects in research designs is strongly encouraged.

RDoC was envisioned from the outset as a dynamic and continually evolving framework. Its domains and constructs are considered as strong, data-based exemplars rather than a closed set, and it was anticipated (and expected) that the specific components should change on the basis of emerging data. A transparent, data-driven method for proposing and vetting updates to the framework was accordingly a high priority once the project was underway. After considering various alternatives for this purpose, the Institute decided that the optimal method was to create an ongoing National Advisory Mental Health Council (NAMHC) workgroup that would direct the process of evaluating and reaching consensus on proposed changes to the RDoC framework, with reports

submitted to the full Council for approval. In May 2016, the NAMHC approved the formation of the Council workgroup to oversee future changes to the RDoC matrix. The main charge for this group is two-fold: first, to develop a standardized method for the field to submit proposed changes to the RDoC matrix; and, second, to evaluate proposed changes and make informed final recommendations to the NAMHC for approval.

The Changes to the RDoC Matrix (CMAT) Council Workgroup

The co-chairs (David A. Brent and Gregory A. Miller) for the workgroup were identified at the May 2016, NAMHC meeting, and three Council members volunteered to be members of the workgroup (Patricia Areán, Deanna Barch, and Hakon Heimer). Subsequently, the RDoC Unit began the process of recruiting additional participants for the full group, seeking appropriate representation for relevant content-area and methodological expertise (a full group roster is included in [Appendix C: Workgroup Roster](#)). In order to provide appropriate expertise and enhance transparency, the workgroup was encouraged to recruit additional ad hoc consultants as needed for consideration of particular proposed modifications. An implicit and longer-term goal is to benefit from the deliberations of the workgroup in considering future changes to the nature of the RDoC initiative. The initial full group teleconference was held in August 2017.

Workgroup Charge

The CMAT workgroup has been charged with two main tasks. The first is to develop a standardized format for the scientific community to use in submitting suggested revisions to the matrix; the second is to develop a process for evaluating the proposed changes and making final recommendations to the NAMHC. Potential revisions could be relatively small in scope, such as a revision to existing constructs and domains (e.g., reorganization of constructs, rewrite of definitions); or, proposed revisions might be larger in scope, such as additions of entirely new domains or constructs. It is anticipated that the deliberations of the CMAT workgroup will also inform revisions to the overall RDoC framework (e.g., the development of more computationally-based approaches to studying and incorporating new and revised dimensional constructs).

The charge provided a starting point for how to evaluate the evidence for proposed changes to the framework. For instance, when considering the addition of a **domain**, there should be a grouping of at least two (but probably three or more) potential constructs that all reflect the particular broad class of functioning meant to be captured by that domain; further, such constructs should be convergent with other constructs in the domain and differentiated from constructs in other domains. When evaluating the evidence for the addition of a new **construct**, the following three criteria (utilized in the original RDoC workshops) must be satisfied:

1. Is there evidence for the validity of the construct as a functional unit of behavior?
2. Is there evidence of a neural circuit or system that plays a primary role in implementing the construct's function?
3. Is the construct relevant to understanding some aspect of psychopathology?

The workgroup began with a consideration of these criteria and made several iterations of refinements to the requirements for a domain and a construct to be included in the RDoC framework. These refinements were that a new/revised domain/construct should accommodate an appropriate range of function, that it should not be reducible to an existing RDoC domain/construct, and that there should be well-replicated empirical evidence across several units of analysis. After the group agreed on the requirements for both a domain and a construct, they considered the first proposed set of changes to the RDoC matrix. This set had been proposed by the 2016 NAMHC Workgroup on Tasks and Measures for RDoC, which was organized into five subgroups (one for each of the five domains). As part of its report following that 2016 meeting, the Positive Valence Domain subgroup suggested a modest reorganization of the constructs in the Positive Valence domain; their recommendations were driven by data published since the original Positive Valence workgroup five years previously. The current CMAT Council Workgroup considered this an efficient place to start, as much of the rationale for the change was included in the 2016 published report.

Reorganization of the Positive Valence Domain

New Proposed Organization

The proposed reorganization is shown below, placed alongside the current organization for comparison. There are some constructs/sub-constructs that are included in both current and proposed versions (e.g., Reward Learning, Effort), some moving of constructs to sub-constructs (e.g., Initial Responsiveness to Reward), and some additions of new concepts (e.g., Probabilistic and Reinforcement Learning). The recommendation for the reorganization was made in an attempt to make the constructs more straightforward and less redundant, and also to align more closely with recent data stemming from such areas as reinforcement learning, reward prediction errors, and response to reward.



Current Organization

Construct/Sub-construct
1. Approach Motivation
1.1. <i>Reward Valuation</i>
1.2. <i>Effort Valuation/Willingness to Work</i>
1.3. <i>Expectancy/Reward Prediction Error</i>
1.4. <i>Action Selection/Preference Based Decision Making</i>
2. Initial Responsiveness to Reward
3. Sustained Responsiveness to reward
4. Reward Learning
5. Habit

Proposed Reorganization

Construct/Sub-construct
1. Reward Responsiveness
1.1. <i>Reward Anticipation</i>
1.2. <i>Initial Response to Reward</i>
1.3. <i>Reward Satiation</i>
2. Reward Learning
2.1. <i>Probabilistic and Reinforcement Learning</i>
2.2. <i>Reward Prediction Error</i>
2.3. <i>Habit</i>
3. Reward Valuation
3.1. <i>Reward (probability)</i>
3.2. <i>Delay</i>
3.3. <i>Effort</i>

Evaluation of Proposed Change

The CMAT Workgroup identified a three-member subcommittee to lead a discussion about the proposed reorganization. Their assessment of the report from the 2016 NAMHC RDoC subgroup concluded that the recommendations reflected considerable expertise and thought and deserved strong consideration. The original 2011 organization for the Positive Valence domain was framed from a relatively theoretical perspective. The subgroup's report noted that a strength of the proposed reorganization is that it more clearly reflects an empirically driven organization. This new organization is also more closely aligned with computational and animal model perspectives, as well as human neuroimaging. A common complaint with the original organization was that the construct *Sustained Responsiveness to Reward* was unclear and ill-defined, and the new organization aims to be clearer.

There was additional conversation among the CMAT group about the factors that might enable some people to avert negative outcomes, focusing on resilience and negative attributional biases. It was concluded that, although these are important concepts to consider when studying mental health, their mechanisms and neural or genetic contributions are not well enough understood at the present time to include them in the RDoC matrix. Additionally, the group noted that some of the constructs seemed highly

overlapping, specifically reward valuation, reward probability, and reward learning. The group concluded that although they may overlap, there is also evidence for this dissociation, and that overlaps could be best addressed by carefully delineated definitions, and ultimately agreed upon definitions that make the distinctions between the constructs more apparent.

Given the discussion, the CMAT group decided that the new organization was an improvement on the original organization and recommended its implementation into the RDoC matrix. It should be noted that the constructs in the RDoC matrix have always been intended to serve as exemplars rather than being prescriptive, and the current state of the field reflects a spectrum of approaches to studying reward-related processes; therefore, any ongoing RDoC-related research framed in terms of the original organization will retain its value in making a strong contribution to the literature.

Newly Defined Domain and Constructs

After ratifying the new organization of the Positive Valence Domain, the CMAT workgroup turned to new/revised definitions for the constructs and subconstructs. This resulted in a considerable amount of thoughtful discussion, and wordings were carefully reconsidered. Members of the Positive Valence Domain group from the 2016 NAMHC Workgroup for Tasks and Measures were contacted and provided comments and feedback as well¹. The following are the CMAT group's final definitions for the Positive Valence Domain.

Positive Valence Systems

Positive Valence Systems are primarily responsible for responses to positive motivational situations or contexts, such as reward seeking, consummatory behavior, and reward/habit learning.

1. Reward Responsiveness

Processes that govern an organism's hedonic response to impending or possible reward (as reflected in reward anticipation), the receipt of reward (as reflected in initial response to reward) and following repeated receipt of reward (as in reward satiation); across these subdomains, reward responsiveness primarily reflects neural activity to receipt of reward and reward cues and can also be measured in terms of subjective and behavioral responses.

1.1. *Reward Anticipation*

Processes associated with the ability to anticipate and/or represent a future incentive—as reflected in language expression, behavioral responses, and/or engagement of the neural systems to cues about a future positive reinforcer.

¹ 2016 Positive Valence group members are Mauricio R. Delgado, Paul W. Glimcher, Greg Hajcak, Diego A. Pizzagalli, Michael T. Treadway, and Benjamin, E. Yerys

1.2. *Initial Response to Reward*

Processes evoked by the initial presentation of a positive reinforcer as reflected by indices of neuronal activity and verbal or behavioral responses.

1.3. *Reward Satiation*

Processes associated with the change in incentive value of a reinforcer over time as that reinforcer is consumed or experienced, as reflected in language expression, behavioral responses, and/or engagement of the neural systems.

2. Reward Learning

A process by which organisms acquire information about stimuli, actions, and contexts that predict positive outcomes, and by which behavior is modified when a novel reward occurs, or outcomes are better than expected. Reward learning is a type of reinforcement learning.

2.1. *Probabilistic and Reinforcement Learning*

The ability to learn which actions or stimuli are associated with obtaining a reinforcer, even when a particular action or stimulus is not always associated with obtaining the reinforcer.

2.2. *Reward Prediction Error*

Processes associated with the difference between anticipated and obtained rewards are important for reinforcement learning. The error can indicate that the reward received was either larger than expected (positive prediction error) or smaller than expected (negative prediction error).

2.3. *Habit*

Sequential, repetitive, motor behaviors or cognitive processes elicited by external or internal triggers that, once initiated, can go to completion without continuous effortful oversight. Habits can be adaptive by virtue of freeing up cognitive resources. Habit formation is a frequent consequence of reward learning, but, over time, its expression can become resistant to changes in outcome value. Some habit-related behaviors could be pathological expressions of processes that under other circumstances subserve adaptive goals.

3. Reward Valuation

Processes by which the probability and benefits of a prospective outcome are computed by reference to external information, social context (e.g., group input), and/or prior experience. This computation is influenced by preexisting biases, learning, memory, stimulus characteristics, and deprivation states. Reward valuation may involve the assignment of incentive salience to stimuli.

3.1. *Reward (ambiguity/risk)*

Process by which the value of a reinforcer is computed as a function of its magnitude, valence and predictability.

3.2. *Delay*

Processes by which the value of a reinforcer is computed as a function of its magnitude and the time interval prior to its expected delivery.

3.3. *Effort*

Processes by which the value of a reinforcer is computed as a function of its magnitude and the perceived costs of the physical or cognitive effort required to obtain it.

APPENDIX A: RDoC MATRIX DOMAIN, CONSTRUCTS, AND SUBCONSTRUCT DEFINITIONS

As defined during the initial RDoC workshops.

Arousal/Regulatory Systems: Systems responsible for generating activation of neural systems as appropriate for various contexts and providing appropriate homeostatic regulation of such systems as energy balance and sleep.

- **Arousal:** Arousal is a continuum of sensitivity of the organism to stimuli, both external and internal. Arousal:
 - facilitates interaction with the environment in a context-specific manner (e.g., under conditions of threat, some stimuli must be ignored while sensitivity to and responses to others is enhanced, as exemplified in the startle reflex);
 - can be evoked by either external/environmental stimuli or internal stimuli (e.g., emotions and cognition);
 - can be modulated by the physical characteristics and motivational significance of stimuli;
 - varies along a continuum that can be quantified in any behavioral state, including wakefulness and low-arousal states including sleep, anesthesia, and coma;
 - is distinct from motivation and valence but can co-vary with intensity of motivation and valence;
 - may be associated with increased or decreased locomotor activity; and
 - can be regulated by homeostatic drives (e.g., hunger, sleep, thirst, sex).

- **Circadian Rhythms:** Circadian Rhythms are endogenous self-sustaining oscillations that organize the timing of biological systems to optimize physiology and behavior, and health. Circadian Rhythms:
 - are synchronized by recurring environmental cues;
 - anticipate the external environment;
 - allow effective response to challenges and opportunities in the physical and social environment;
 - modulate homeostasis within the brain and other (central/peripheral) systems, tissues and organs; and
 - are evident across levels of organization including molecules, cells, circuits, systems, organisms, and social systems.

- **Sleep and wakefulness:** Sleep and wakefulness are endogenous, recurring, behavioral states that reflect coordinated changes in the dynamic functional organization of the brain and that optimize physiology, behavior, and health. Homeostatic and circadian processes regulate the propensity for wakefulness and sleep. Sleep:
 - is reversible, typically characterized by postural recumbence, behavioral quiescence, and reduced responsiveness;
 - has a complex architecture with predictable cycling of NREM/REM states or their developmental equivalents. NREM and REM sleep have distinct neural substrates (circuitry, transmitters, modulators) and EEG oscillatory properties
 - intensity and duration are affected by homeostatic regulation;
 - is affected by experiences during wakefulness;
 - is evident at cellular, circuit, and system levels; and
 - has restorative and transformative effects that optimize neurobehavioral functions during wakefulness.

Cognitive Systems: Systems responsible for various cognitive processes (e.g., attention, perception, memory, language, and cognitive control).

- **Attention:** Attention refers to a range of processes that regulate access to capacity-limited systems, such as awareness, higher perceptual processes, and motor action. The concepts of capacity limitation and competition are inherent to the concepts of selective and divided attention.
- **Perception:** Perception refers to the process(es) that perform computations on sensory data to construct and transform representations of the external environment, acquire information from, and make predictions about, the external world, and guide action.
- **Declarative Memory:** Declarative memory is the acquisition or encoding, storage and consolidation, and retrieval of representations of facts and events. Declarative memory provides the critical substrate for relational representations—i.e., for spatial, temporal, and other contextual relations among items, contributing to representations of events (episodic memory) and the integration and organization of factual knowledge (semantic memory). These representations facilitate the inferential and flexible extraction of new information from these relationships.
- **Language:** Language is a system of shared symbolic representations of the world, the self and abstract concepts that supports thought and communication.
- **Cognitive Control:** A system that modulates the operation of other cognitive and emotional systems, in the service of goal-directed behavior, when prepotent modes of responding are not adequate to meet the demands of the current context. Additionally, control processes are engaged in the case of novel contexts, where appropriate responses need to be selected from among competing alternatives.
- **Working Memory:** Working Memory is the active maintenance and flexible updating of goal/task relevant information (items, goals, strategies, etc.) in a form that has limited capacity and resists interference. These representations: may involve flexible binding of representations; may be characterized by the absence of external support for the internally maintained representations; and are frequently temporary, though

this may be due to ongoing interference. It involves active maintenance, flexible updating, limited capacity, and interference control.

Negative Valence Systems: Systems primarily responsible for responses to aversive situations or contexts, such as:

- **Responses to acute threat (Fear):** Activation of the brain's defensive motivational system to promote behaviors that protect the organism from perceived danger. Normal fear involves a pattern of adaptive responses to conditioned or unconditioned threat stimuli (exteroceptive or interoceptive). Fear can involve internal representations and cognitive processing and can be modulated by a variety of factors.
- **Responses to potential harm (Anxiety):** Activation of a brain system in which harm may potentially occur but is distant, ambiguous, or low/uncertain in probability, characterized by a pattern of responses such as enhanced risk assessment (vigilance). These responses to low imminence threats are qualitatively different than the high imminence threat behaviors that characterize fear.
- **Responses to sustained threat:** An aversive emotional state caused by prolonged (i.e., weeks to months) exposure to internal and/or external condition(s), state(s), or stimuli that are adaptive to escape or avoid. The exposure may be actual or anticipated; the changes in affect, cognition, physiology, and behavior caused by sustained threat persist in the absence of the threat and can be differentiated from those changes evoked by acute threat.
- **Frustrative non-reward:** Reactions elicited in response to withdrawal/prevention of reward, i.e., by the inability to obtain positive rewards following repeated or sustained efforts.
- **Loss:** A state of deprivation of a motivationally significant con-specific, object, or situation. Loss may be social or non-social and may include permanent or sustained loss of shelter, behavioral control, status, loved ones, or relationships. The response to loss may be episodic (e.g., grief) or sustained.

Positive Valence Systems: Systems primarily responsible for responses to positive motivational situations or contexts, such as:

- **Approach motivation:** A multi-faceted construct involving mechanisms/processes that regulate the direction and maintenance of approach behavior influenced by preexisting tendencies, learning, memory, stimulus characteristics, and deprivation states. Approach behavior can be directed toward innate or acquired cues (i.e., unconditioned vs. learned stimuli), implicit or explicit goals; it can consist of goal-directed or Pavlovian conditioned responses. Component processes include reward valuation, effort valuation/willingness to work, expectancy/reward prediction error, and action selection/decision making.
 - **Reward valuation:** Processes by which the probability and benefits of a prospective outcome are computed and calibrated by reference to external information, social context (e.g., group input, counterfactual comparisons), and/or

prior experience. This calibration is influenced by preexisting biases, learning, memory, stimulus characteristics, and deprivation states. Reward valuation may involve the assignment of incentive salience to stimuli.

- **Effort valuation/Willingness to work:** Processes by which the cost(s) of obtaining an outcome is computed; tendency to overcome response costs to obtain a reinforcer.
 - **Expectancy/Reward prediction error:** A state triggered by exposure to internal or external stimuli, experiences or contexts that predict the possibility of reward. Reward expectation can alter the experience of an outcome and can influence the use of resources (e.g., cognitive resources).
 - **Action selection/Preference-based decision making:** Processes involving an evaluation of costs/benefits and occurring in the context of multiple potential choices being available for decision-making.
- **Initial responsiveness to reward attainment:** Mechanisms/processes associated with hedonic responses—as reflected in subjective experiences, behavioral responses, and/or engagement of the neural systems to a positive reinforcer—and culmination of reward seeking.
 - **Sustained/Longer-term responsiveness to reward attainment:** Mechanisms/processes associated with the termination of reward seeking, e.g., satisfaction, satiation, regulation of consummatory behavior.
 - **Reward Learning:** A process by which organisms acquire information about stimuli, actions, and contexts that predict positive outcomes, and by which behavior is modified when a novel reward occurs, or outcomes are better than expected. Reward learning is a type of reinforcement learning, and similar processes may be involved in learning related to negative reinforcement.
 - **Habit:** Sequential, repetitive, motor, or cognitive behaviors elicited by external or internal triggers that, once initiated, can go to completion without constant conscious oversight. Habits can be adaptive by virtue of freeing up cognitive resources. Habit formation is a frequent consequence of reward learning, but its expression can become resistant to changes in outcome value. Related behaviors could be pathological expression of a process that under normal circumstances subserves adaptive goals.

Systems for Social Processes: Systems that mediate processes to interpersonal settings of various types, including perception and interpretation of others' actions.

- **Affiliation and Attachment:** Affiliation is engagement in positive social interactions with other individuals. Attachment is selective affiliation as a consequence of the development of a social bond. Affiliation and Attachment are moderated by social information processing (processing of social cues) and social motivation. Affiliation is a behavioral consequence of social motivation and can manifest itself in social approach behaviors. Affiliation and Attachment require detection of and attention to social cues, as well as social learning and memory associated with the formation of relationships. Affiliation and Attachment include both the positive physiological consequences of social interactions and the behavioral and physiological

consequences of disruptions to social relationships. Clinical manifestations of disruptions in Affiliation and Attachment include social withdrawal, social indifference and anhedonia, and over-attachment.

- **Social Communication:** A dynamic process that includes both receptive and productive aspects used for exchange of socially relevant information. Social communication is essential for the integration and maintenance of the individual in the social environment. This construct is reciprocal and interactive, and social communication abilities may appear very early in life. Social communication is distinguishable from other cognitive systems (e.g., perception, cognitive control, memory, attention) in that it particularly involves interactions with conspecifics. The underlying neural substrates of social communication evolved to support both automatic/reflexive and volitional control, including the motivation and ability to engage in social communication. Receptive aspects may be implicit or explicit; examples include affect recognition, facial recognition and characterization. Productive aspects include eye contact, expressive reciprocation, and gaze following. Although facial communication was set aside as a separate sub-construct for the purposes of identifying matrix elements, social communication typically utilizes information from several modalities, including facial, vocal, gestural, postural, and olfactory processing. Social Communication was organized into the following sub-constructs:
 - **Reception of Facial Communication:** The capacity to perceive someone’s emotional state non-verbally based on facial expressions.
 - **Production of Facial Communication:** The capacity to convey one’s emotional state non-verbally via facial expression.
 - **Reception of Non-Facial Communication:** The capacity to perceive social and emotional information based on modalities other than facial expression, including non-verbal gestures, affective prosody, distress calling, cooing, etc.
 - **Production of Non-Facial Communication:** The capacity to express social and emotional information based on modalities other than facial expression, including non-verbal gestures, affective prosody, distress calling, cooing, etc.
- **Perception and Understanding of Self:** The processes and/or representations involved in being aware of, accessing knowledge about, and/or making judgments about the self. These processes/representations can include current cognitive or emotional internal states, traits, and/or abilities, either in isolation or in relationship to others, as well as the mechanisms that support self-awareness, self-monitoring, and self-knowledge. Perception and Understanding of Self was organized into the following sub-constructs:
 - **Agency:** The ability to recognize one’s self as the agent of one’s actions and thoughts, including the recognition of one’s own body/body parts.
 - **Self-Knowledge:** The ability to make judgments about one’s current cognitive or emotional internal states, traits, and/or abilities.

- **Perception and Understanding of Others:** The processes and/or representations involved in being aware of, accessing knowledge about, reasoning about, and/or making judgments about other animate entities, including information about cognitive or emotional states, traits or abilities. Perception and Understanding of Others was organized into the following sub-constructs:
 - **Animacy Perception:** The ability to appropriately perceive that another entity is an agent (i.e., has a face, interacts contingently, and exhibits biological motion).
 - **Action Perception:** The ability to perceive the purpose of an action being performed by an animate entity.
 - **Understanding Mental States:** The ability to make judgments and/or attributions about the mental state of other animate entities that allows one to predict or interpret their behaviors. Mental state refers to intentions, beliefs, desires, and emotion.



APPENDIX B: NAMHC ROSTER

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APPENDIX D: WORKGROUP CHARGE

The National Advisory Mental Health Council Workgroup on Revisions to the RDoC Matrix

This National Advisory Mental Health Council Workgroup will advise the NIMH on revisions and modifications to the RDoC matrix. Currently, the RDoC matrix consists of five domains of human behavior and functioning, associated constructs and sub-constructs, and elements in the cells of the matrix across the various units of analysis used to index them. These were established and outlined via a series of workshops from 2010 – 2012. Since that time, various researchers have proposed additions and revisions to existing domains, constructs, units of analysis and elements (referred to as “components” from this point on). The purpose of this workgroup is to evaluate the evidence for a modification of the matrix and recommend precisely how to include the information for that component.

Changes to the matrix may range from minor emendations to major changes such as a new domain. The workgroup members will not be solely responsible for the substantive evaluation of proposed changes, but rather act as a coordinating committee whose members suggest and recruit subject-matter experts as needed. After receiving input from these outside experts, the workgroup would compile a brief report for submission to the Advisory Council for its approval. A primary function of this workgroup would be to provide a consistent approach to the strength of evidence needed to recommend any particular change.

Examples of the kinds of modifications that might be initially considered include some “clean-up” revisions to the Positive Valence Domain as suggested by our recent “Tasks and Measures” Council workgroup; changes to various parts of the matrix that result from our recent motor domain workshop; decisions on how to handle the “Genes” column of the matrix so that it does not lend support for candidate gene studies, but still maintains the importance of a genetic contribution to mental health; considering the addition of a “resting state” construct to the Arousal/Regulatory domain; fleshing out the Language construct; and potential addition of a new Domain for behavioral inhibition/regulation.

As a part of this work, the workgroup will also help to establish criteria for making a change to the matrix. Ideally, the process for submitting a possible update or revision to the matrix will one day be made quite transparent, and easy for the field to do. We might hope to develop a clear and structured web-form, that would require some specific information and justification for the proposed change. The information provided, forming a large basis of the ground work for the evaluation, would then be evaluated by this workgroup, and the next steps would be coordinated. Depending on the nature of the proposed change, the next steps may be to convene a large multi-day workshop to assess the current state of the field and make consensus decisions, as in the development of a new domain. Or, the next steps may be to hold a phone call with a few content-area experts to make more minor changes, as in the redefinition of a construct.

When evaluating the evidence for the addition of a domain, there should be a grouping of at least two (but probably 3 or more) potential constructs that all reflect a particular broad class of functioning; and, that (preferably by data analysis, but at least by face validity) tend to be more related as compared to constructs in other domains.

When evaluating the evidence for the addition of a new construct, the following three criteria (utilized in the original RDoC workshops) must be satisfied:

1. Is there evidence for the validity of the construct as a functional unit of behavior?
2. Is there evidence of a neural circuit or system that plays a primary role in implementing the construct's function?
3. Is the construct relevant to understanding some aspect of psychopathology?

The workgroup may optimize these basic criteria for components by the addition of other conditions. Examples of such requirements include the following: What is the need for that component or for the revision of the component? Is it clear that the current version of matrix does not include the component or its analog? What is the rigor of evidence for the modification or addition of that component? Are there any practical or logistical concerns to including that component such as assessment issues, or degree of specificity to mental disorders (as opposed to neurological disorders)? What would the appropriate grain size for constructs be? etc.

This workgroup will decide on the best meeting schedule that will work for them. One suggestion is to meet bi-monthly or quarterly and address the latest suggested changes. The group will then be asked to help form “sub-committees”, or secondary workgroups with the content area experts needed to adequately vet or recommend the necessary change. Each subcommittee will ultimately report back to this over-arching workgroup, and this workgroup will report directly to the National Advisory Mental Health Council.

After the workgroup makes their decision, a successful report to the NAMHC will provide (1) a brief overview of the current status of the matrix with respect to that component, (2) the rationale for the proposed change to that component, (3) the evidence for or against the proposed change to the component, and (4) the final recommendation of the workgroup with regard to that component.