

Replacing Maslow's Needs Hierarchy With an Account Based on Stage and Value

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Maslow's needs hierarchy consisted of a set of mentalistic inferences. The new account takes the same situations that Maslow accounts for while using behavioral metrics. This model of value and stage is applied to Maslow's needs hierarchy model. Needs may be understood as primary and secondary reinforcers that change with stage. Primary reinforcers are biologically built-in, such as food, sleep, and social stimuli. Secondary reinforcers are learned when paired with a primary reinforcer. For example, money is a powerful reinforcer when paired with things it can purchase. Secondary reinforcers are stimuli that have conditioned become reinforcing by pairing with a previously reinforcing stimulus. As one moves up in stage, secondary reinforcers become more complex. Individuals who understand complex contingencies may be more likely to act on long term benefits. An example of a secondary reinforcer is money. Individuals who score higher on Maslow's hierarchy should also show higher stage social perspective taking skill.

Keywords: drives, Maslow, needs, reinforcement value, stage

Abraham Maslow (1943) developed a needs hierarchy. The needs in this hierarchy were said to motivate people. In this view, individuals are motivated to fulfill lower level needs before working to fulfill higher-level needs. The needs in consideration progress from (a) Physiological Needs, (b) Safety, (c) Belonging, (d) Love/Esteem, to (e) Self-Actualization Needs. Each of these needs has specific characteristics.

A behavior analytic view focuses on drive operations that determine the value of consequences. It differs from Maslow's account in that there are no directly observable environmental actions that set up the needs in Maslow. The exception would be the physiological needs.

Physiological needs correspond to homeostasis and behaviors required to maintain it. This

category includes things like food and water. Maslow argues that such needs are of primary importance when they are not met. Safety needs refer to considerations of protection from bodily harm and environmental stability. Love/Belonging needs refer to the needs involved in being an accepted member of one or more social structures. They have their evolutionary history in attachment and affiliativeness. Esteem has to do with achieving confidence, and respect from one's self and others. Self-Actualization Needs refer to the pursuit of needs such as morality, creativity, and acceptance of facts (see Figure 1). This hierarchy of needs was presented as a model of human motivation. In this model, higher needs will not be as motivating until lower needs are fulfilled.

It is important that needs be defined more formally. Here, it is suggested that Maslow's hierarchy of needs be interpreted from the perspective of Behavioral Developmental stage as defined in the model of hierarchical complexity combined with notions of reinforcement value. In this analysis, needs are interpreted as drives that give reinforcers their value. The satisfaction of needs is integral to the maintenance of a consistent rate of reinforcement. There things that have reinforcement value that do not have

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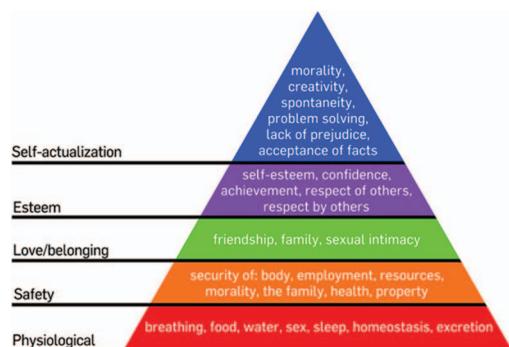


Figure 1. Maslow's Hierarchy of Needs visualized as a pyramid. See the online article for the color version of this figure.

any obvious relationship to the fulfillment of needs. For example, rats will work for saccharin, despite that fact that saccharin has no nutritional value, and therefore no effect on the homeostasis of the rat (Sclafani, & Clare, 2004).

Needs in Maslow's conception are similar to drives in the conception of Hull. Drive theory is a model of reinforcement systems where habits are formed by reinforcing particular behaviors (Hilgard, & Bower, 1975). Reinforcement in this model is a response to a behavior that leads to an effect that satiates a need. This satiation of needs creates causes behaviors to be repeated. Hull referred to this concept as drive-reduction, or drive-stimulus reduction.

The Model of Hierarchical Complexity

As described by Commons, Miller, and Giri (2014), the Model of Hierarchical Complexity (MHC) is a nonmentalistic, neo-Piagetian mathematical model (Krantz, Luce, Suppes, & Tversky, 1971; Luce & Tukey, 1964). The model breaks down tasks into the actions that have to be done at each order. This allows for the measurement of Order of Hierarchical Complexity and the corresponding stage performance. An analytic and a priori measurement of the difficulty of task actions states that the difficulty is represented by the Orders of Hierarchical Complexity (OHC) (Commons & Pekker, 2008). At this time, there are 17 known Orders of Hierarchical Complexity (see Table 1).

Order of Hierarchical Complexity (OHC) refers to the number of times that the coordinating actions must organize next lower order actions.

The OHC of an action is determined by how many times the action has to be decomposed into the two or more simpler actions until one gets to a simple action that may not be decomposed. This iterative process is done until the organization may be carried out on just a set of simple actions. As shown in Figure 2, actions at a higher Order of Hierarchical Complexity (a) are defined in terms of actions at the next lower Order of Hierarchical Complexity, (b) organize and transform the lower-order actions, (c) produce organizations of lower-order actions that are new and not arbitrary, and (d) cannot be accomplished by those lower-order actions alone. Once these conditions have been met, the higher-order action coordinates the actions of the next lower order.

An example of arithmetic distributivity illustrates how lower actions get organized into more hierarchically complex actions. Carrying out the entire operation $3 \times (4 + 1)$ is the distributive action. That distributive action nonarbitrarily coordinates the two lower order actions of adding and multiplying. The distributive action is therefore one order more hierarchically complex than the acts of adding and multiplying.

Figure 2 is a visual representation of lower hierarchical order of complexity, n , tasks being coordinated nonarbitrarily into higher order ($n +$

Table 1
Order Number and Order Name

Order number	Order name
0	Computational
1	Automatic
2	Sensory or motor
3	Circular sensory-motor
4	Sensory-motor
5	Nominal
6	Sentential
7	Preoperational
8	Primary
9	Concrete
10	Abstract
11	Formal
12	Systematic
13	Metasystematic
14	Paradigmatic
15	Crossparadigmatic
16	Metacrossparadigmatic

Note. From "Correspondence between some life-span stage theory developmental sequences of stages and levels," by C. T. Tuladhar & M. L. Commons, 2014, *Behavioral Development Bulletin*, 19, p. 26. Copyright 2014 by Association for Behavior Analysis. Adapted with permission.

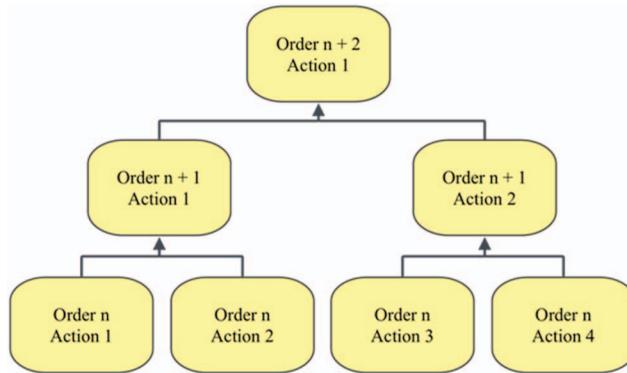


Figure 2. Visual representation of lower order (n) tasks being coordinated nonarbitrarily into higher order ($n + 1$) of hierarchical complexity tasks, and then finally the two higher orders of hierarchical complexity tasks are coordinated in a single task at the next higher order. See the online article for the color version of this figure.

1) tasks, and then finally the two higher order tasks are coordinated in a single task at the next higher order.

Value

Researchers have defined and formalized what reinforcement and its value are and how they can be expressed and measured (e.g., Görtz & Commons, in press; Herrnstein, 1970). Below is an account of what reinforcement value means in this article. Value is determined by some form of choice from consequences. In the Matching Law of Herrnstein, the relative rate of responding is proportional to the relative value of the obtain consequence as delivered in particular schedules of reinforcement.

The value of a reinforcer is derived from the aggregated amount of reinforcement earned by the organism in question when a similar stimulus is presented. Here needs are to be understood as reinforcers that change with stage. These stage-dependent reinforcers stratify reinforcement into categories. Each of these categories begins to become salient at a particular stage. However, the lower stage reinforcers never lose salience and remain highly important to lives of higher stage organisms. This is what generates Maslow's hierarchy of needs.

At different stages of development, there are different sources of reinforcement. This process begins with primary reinforcers that are generally naturally reinforcing, such as food, water and sleep. Secondary reinforcers are learned in

a stage sequence. The more abstract social ones such as group approval, holding of principles and searching for the truth develop later, if at all. Higher order reinforcers, include sticking to one's moral principles as when upholding the right of free speech that one hates, would be Stage 13, Metasystematic in the hierarchy.

The Interaction of Value and Stage of Performance

Maslow's Hierarchy of Needs may be interpreted as an interaction between stage and value. This stems from the notion that the behavioral developmental stage of an organism limits which of the needs that the organism finds reinforcing. The purpose of this analysis is to propose a specific mechanism for why the needs will largely change with development.

The suggestion for what mechanism might look like, both in terms of what reinforcers are important at different stages, and in terms of which of Maslow's needs are most important at each stage, are shown in Table 2.

To demonstrate the interaction between stage of development and reinforcement value, the following paragraph shows how different reinforcers become salient as the infant rises in stage of development. As different reinforcers become salient, different needs emerge.

First, it is important to point out that, at birth, most human infant behavior would be at Stage II. The first stage in the Model of Hierarchical Complexity, Calculatory, is postulated to apply only to

Table 2
Correspondence Between Different Stages of Development and Different Maslow Needs, by Showing the Stage, Example Behavior, and Corresponding Need

Order number	Order name	Examples of reinforcers or punishers	Highest Maslow need
0	Calculatory	Not human	Not human
1	Automatic	Not human	Physiological; safety
2	Sensory or motor	Water, food, protection from the elements, bodily wellness, being held when distressed	Physiological; safety
3	Circular sensory-motor	Observed pleasure in repetition of actions with effects; recognition and pleasure in these routines especially with familiar caregivers	Physiological; safety
4	Sensory-motor	Seek attachment figures when uncertain; this contact is reinforcing, explore environment in presence of secure relationships (exploring is reinforcing)	Belonging
5	Nominal	Perform tasks correctly (such as tasks they see done by others); obtain outcomes after saying single words	Belonging
6	Sentential	Being good and being oppositional are experimented with and are followed by outcomes such as attention; avoiding feared situations	Esteem
7	Preoperational	Being good then being bad results in outcomes such as being treated better; telling stories and having people listen to them	Esteem
8	Primary	Obtain property, and gain, tell a story and explain whether it matches reality or not	Esteem
9	Concrete	Make fair trades, and receive the benefits from them. Have group of friends who attend to each other and share objects.	Esteem
10	Abstract	Being treated as part of a group	Actualization
11	Formal	Satisfaction from enforcing regulations, navigating bureaucracy	Actualization
12	Systematic	Satisfaction from writing laws, moving up in a system, making multiple consideration complex decisions, reorganize corporate departments	Actualization
13	Metasystematic	Satisfaction from determining which corporate departments should handle particular issues, which departments should be merged, making and comparing business plans	Actualization
14	Paradigmatic	Involve all stakeholders in processes	Actualization
15	Crossparadigmatic	Integrate economic concerns, reflect on the insolvability of various models of economic concerns each	Actualization
16	Metacrossparadigmatic	Integrating caring and fairness, with political paradigms and economic paradigms. Reflect on insolvability of such integration	Actualization

Note. From left to right shows the number and name of each order of hierarchical complexity, proposed likely reinforcing events, and the predicted need from Maslow's scheme that is central at that stage.

machines, which are preprogrammed in a nonflexible fashion. The next stage, Automatic Stage I, characterizes the behavior of single-celled organisms that respond to very specific stimuli in an automatic way. Nevertheless, even at Stage I, in

these simple organisms, it can be said that Maslow's most basic need, satisfying physiological and safety needs, is present. At the Sensory or Motor Stage II, human infants engage in simple, single actions, such as reflexes, and can habituate

or sensitize to stimuli. They can also be classically conditioned, starting from birth (Blass, Ganchrow, & Steiner, 1984). As can be seen from Table 2, Satisfy Physiological and Safety Needs are clearly salient by Stage II. The Belonging need can be most clear seen starting at the Sensory-Motor Stage IV, when infants show use of the caregiver as a secure base. As young children begin to obtain increasing amounts of feedback for their behavior, starting at the Sentential Stage 6, this is the beginning of the Esteem need period. Finally, the beginning of the actualization need can be seen at Abstract Stage 10, when individuals increasingly begin to place themselves in a wider social context.

Although Maslow needs emerge at particular stages, the lower needs never lose salience. The way that these needs express themselves changes with stage. The next section will show examples of how needs become transformed and/or express themselves at the different stages.

How Behaviors That Are Directed Toward Satisfying “Physiological Need” Differ at Different Orders of Hierarchical Complexity

Physiological needs apply to anything that is alive, and therefore start at Automatic Stage I. However, needs that occur at the beginning of

development. These needs continue to exist across the life span. They often are satisfied through higher stage means as people develop. Table 3 is an account of different ways to satisfy physiological needs at different stages. Note that the generalized reinforcer for satisfying a particular need is the same at each stage, as also shown.

Stages of “Safety Need Behaviors” Responses to “Physical and Economic Danger”

The need for safety is also present in all animals. Table 4 shows different ways to satisfy safety needs at possible stages. This analysis focuses on humans, so stage one is not included.

Stages of “Belonging Need” Behaviors Friendship

In humans, belonging needs can be observed in starting at Sentential Stage 6. Table 5 shows different ways to satisfy belonging needs at possible stages.

Stages of “Esteem Need Behaviors”

The language Maslow used to describe esteem needs was scored for behavioral development stage. From this reading the authors determined that smiling on task completion, absent social reinforcement, is the first Esteem-

Table 3
Example Behaviors Related to Physiological Needs

Order of hierarchical complexity	Task	Reinforcer
1. Automatic	Ingests in an automatic non-neurally mediated way: Water, Food	Homeostasis; continued life
2. Sensory or motor	Ingests food in a reflexive way	Homeostasis; continued life
3. Circular sensory-motor	Engaging in behavior that is more likely to bring a preferred food	Homeostasis; continued life
4. Sensory-motor	Concept of “Food”	Homeostasis; continued life
5. Nominal	Single word e. g. “Food,” or “Hungry”	Homeostasis; continued life; social reinforcement
6. Sentential	Simple food related sentence “Want food”	Homeostasis; continued life; social reinforcement
7. Preoperational	Explain why they are hungry	Homeostasis; continued life; social reinforcement
8. Primary	Explain why they are hungry, without lying	Homeostasis; continued life; social reinforcement
9. Concrete	Trade for food	Homeostasis; continued life; social reinforcement

Note. From left to right shows the order of hierarchical complexity, the task in question, and the reinforcement for that task.

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Table 4
Example Behaviors Related to Safety Needs

Order of hierarchical complexity	Task	Reinforcer
2. (Sensory or motor)	An infant cries after being startled or unfamiliar stimuli	Caregiver's response to the crying
3. (Circular sensory-motor)	An infant holds their arms out	Caregiver picks up the child
4. (Sensory-motor)	Have concept of safety and danger	More finely attuned approach and avoidance
5. (Nominal)	Says "mommy," or "help"	Caregiver attention, or intervention
6. (Sentential)	Says "mommy come"	Mommy comes
7. (Preoperational)	Dresses themselves	Fitting better with environment
8. (Primary)	Following rules without immediate supervision	Can be alone or with friend unsupervised
9. (Concrete)	Finds a secure job	Regular pay
10. (Abstract)	Buys insurance policies; Puts money into savings accounts; Makes accommodations for disability	Protection from uncertainty

Note. From left to right shows the order of hierarchical complexity, the safety tasks in question, and the reinforcer for that task.

related behavior. This behavior is a Nominal Stage reflection on the task that was completed. Therefore, in humans esteem needs can be observed starting at Nominal Stage 5. [Table 6](#) shows different ways to satisfy esteem needs at possible stages.

“Self-Actualization Need” Behaviors

In humans esteem needs can be observed starting at abstract stage 10. [Table 7](#) contains examples of different ways to satisfy self-actualization needs at possible stages.

Model of How Reinforcement Effects Stage

The following is a discussion of a way to arithmetically model the ways in which reinforcement value for different things changes with the stage the person in question is operating at. We assert that when the stage required to obtain a reinforcer is above one's performance stage, the reinforcer's base value is multiplied by 0, as shown at the bottom left of [Figure 3](#). When the stage required to obtain a reinforcer is below one's stage, its base value is multiplied

Table 5
Example Behaviors Related to Belonging Needs

Order of hierarchical complexity	Task	Reinforcer
6. (Sentential)	Plays in parallel but noninteractive	
7. (Preoperational)	Plays and interacts, with no constant leader; There is a habitual group, playmates; When a person leaves the group they experience almost no loss. The people who are left behind have some loss.	Having other people to assist with play.
8. (Primary)	Playmates chosen by their toys	Having good toys to play with
9. (Concrete)	Makes friend based on the person's traits	Friends with particular traits allow for more focused interactions.
10. (Abstract)	Has group of friends; Somewhat constant social preferences; Can identify culture based on clothing	Acceptance from a large number of individuals

Note. From left to right shows the order of hierarchical complexity, the task in question, and the reinforcer for that task.

Table 6
Example Behaviors Related to Esteem Needs

Order of hierarchical complexity	Task	Reinforcer
5. (Nominal)	Smiles when does things right absent of social approval	Task mastery
6. (Sentential)	Works to be called good	Rise in social status
7. (Preoperational)	Places self in a story about good or bad—like a part of a fairy tale. ‘I was bad and now I am good.’	Improvement
8. (Primary)	Discriminates between a fairy tale and reality.	Rejecting lies places the rejector in a position above the lie that is rejected.
	Acquires property	Each object acquired increases the perceived worth of the owner
9. (Concrete)	Makes fair trades	Acquiring objects, while maintaining relationships.

Note. From left to right shows the order of hierarchical complexity, the task in question, and the reinforcer for that task.

by 1. This is shown at the top right of Figure 3. When the stage required to obtain a reinforcer approaches the order of a reinforcer or punisher, its base value is multiplied by a value along a sigmoid of rising value, as shown in Figure 3. This value rises until they master the stage and the multiplier becomes 1. When one is directly in the middle of transitioning to the stage of the reinforcer, the multiplier is 0.5.

Conclusion

Needs described by Maslow are mentalistic inferences that can be better explained by asking what makes certain events reinforcing. Because an organism cannot value a reinforcer or punisher above its stage, the stage the organism is operating at helps determine what that organism finds reinforcing. As one rises in stage higher stage reinforcers increasingly af-

fect behavior. One cannot “appreciate” the full value a reinforcer until one has mastered tasks at the stage it is at. Therefore the highest Maslow need one can experience is determined by their stage.

The modern interpretation of Maslow’s Hierarchy of Needs lies near two important issues. The first is that the satiation of lower stage reinforcement value leads to higher stage reinforcers becoming more salient. The second is the notion that higher stage reinforcers are built out of hierarchical stacks of reinforcement that can be broken down to a set of primary reinforcers. This suggests that what have been called “secondary reinforcers” are not all equivalent to each other. Some are more directly tied to primary reinforcers. Others are built on secondary reinforcers that are tied to primary reinforcers.

Table 7
Example Behaviors Related to Actualization Needs

Order of hierarchical complexity	Task	Reinforcer
10. (Abstract)	Establishes social norms; Determines correct fashion; Learns correct way to treat others; Learns knowledge deemed socially important	Social Acceptance; Harmony
11. (Formal)	Follows regulations; Enforces regulations; Navigates bureaucracy	Clarity; Neatness; conformist functionality
12. (Systematic)	Writes a law; Reorganizes a corporate department	Determine social order
13. (Metasystematic)	Determines which corporate department should handle a particular issue; Demines which departments should be merged	Control of social order

Note. From left to right shows the order of complexity, the task in question and the reinforcement for that task.

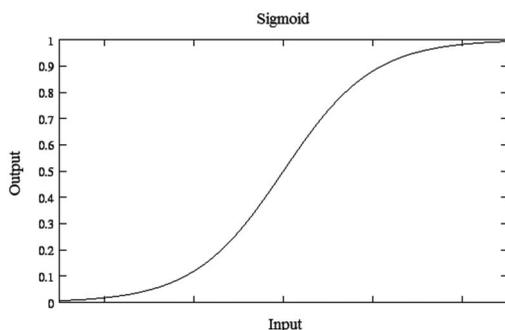


Figure 3. Curve of salience for reinforcers at the next highest stage, as an organism transitions to that stage. Before the transition begins the higher stage reinforcer has zero value for the animal. When the animal is halfway through the transition to the next higher stage, that value of reinforcers at that stage is 0.5. When the animal finishes transitioning to the next higher stage, the value of reinforcement at that stage is multiplied by 1.

An idea presented in this article is that lower stage reinforcement appetites must be met before higher stage reinforcers become salient. This idea allows researchers to ask more specific questions about how environment impacts development and creative output. For example, when a person has their stage of development assessed and it turns out that the person is operating at a higher stage, this could suggest that reinforcers that are also higher stage, perhaps esteem- or even actualization-related, may be more effective.

In this article, it has been shown that a behavioral-developmental stage accounts for Maslow's needs hierarchy. Individuals who score higher on Maslow's hierarchy also show higher stage social perspective taking skill. The needs were behaviorally translated into drive operations. Drive operations events determine the value of consequences. Because the drives change with stage, the connection between value and stage has been made explicit.

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