

Networks for Understanding Human Need

Need networks, human need, capabilities approach, reflective technologies

As social scientists, we seek to understand how social systems form, behave, and evolve over time. A general intention is to figure out how to improve social systems, such that they meet the needs of the constituent individuals in a way that is fair and sustainable. While the concept of human need has been studied by many researchers across various fields, consensus has yet to be reached on important issues, such as determining the needs of specific individuals, and measuring how they are satisfied. Here we present a new ethnoscope: *need networks*, a flexible and empirical approach to modeling human needs and the way those needs are satisfied, elicited through individual reflection and captured in network form. Need networks serve as both a useful technology to assist an individual in reflection and adaptation, as well as a rich data source through which researchers and policymakers can better understand and improve the human condition.

It has been argued that the concept of human need is “present within all the social sciences,” yet is also a concept “interpreted in a mind-boggling number of ways” [1]. Examples from the field of psychology include Maslow’s hierarchy of needs (including various revisions) and Seligman’s PERMA model. Sociologists Doyal and Gough developed a popular model based on health and autonomy, and development economists are perhaps familiar with Max-Neef’s taxonomy of fundamental human needs or Sen and Nussbaum’s capability approach (see [1] for an overview of these and others). The variety of interpretations is no surprise – many of these approaches intentionally under-theorize based on the understanding that elements of human need are socially constructed and individually experienced. Empirical measurement of need, such as human welfare indices like gross national happiness or the human development index, tend to coarse grain individuals into a set of numbers across a few dimensions (income or years of schooling, for example) and are aggregated across swaths of a population. While these numbers can certainly provide useful information for policymakers, they fail to capture valuable data on how needs and satisfiers interact at the individual level.

Need networks, or need nets, provide a medium of capturing individual-level need data in an interpretable network form. Need nets model an individual’s *need landscape*, the space of their perceived needs and how they are satisfied. Need nets are constructed through *reflection* - an individual thinks about their needs, and how they are satisfied, and constructs a network from the resulting findings. Nodes represents two entities: perceived needs, and ways in which a need is satisfied (a “satisfier”). A bi-partite network is constructed from the needs and satisfiers, with edges drawn between satisfiers and the corresponding need. A small part of an example need net is shown in Figure 1.

While need nets are difficult to construct from scratch, technologies such as surveys can help facilitate reflection and response. *Data-first* methods begin with activities and conditions as ground truth satisfiers, and then prompt the individual to state the corresponding need that was satisfied by the particular behavior (e.g. “What need were you fulfilling by playing board games?”). *Schema-first* methods, on the other hand, begin with a *need-schema*, which is a pre-defined set of needs about which an individual is asked (and can be based off any of the taxonomies mentioned above). Differing levels of abstraction or categories in a need-schema enable a variety of purposes for need nets. For example, a need net could include separate nodes for different nutrients needed in a diet, and satisfiers could be specific foods. In addition, need-schemas provide structure through which existing theories of human need can begin to converge. If individuals tend to use the same satisfiers to meet similar sets of needs from different need-schemas, there is evidence those needs are related across the different

schemas. While some of these connections may already be obvious, such as physiological and subsistence needs, need nets hold the promise of empirically finding connections between more abstract and interpreted needs, such as identity, social inclusion, and meaning.

Node and edge attributes can help paint a colorful image of one's need landscape. In Figure 1, the colors of the edges represent the individual's conscious normative feelings about the particular need-satisfier relationship, and the edge weight is indicative of how often that particular satisfier is used to meet that need. Edge direction indicates reflection was prompted by needs instead of satisfiers. A dotted edge indicates that the individual feels they are incapable of using that satisfier to meet that need (and perhaps would not be included in the "capability set" posited in the capability approach). Need node sizes can be adjusted to represent how often a need is felt, or how satisfied that particular need is. Satisfier node sizes could scale with the cost of a satisfier, either in time, money, or environmental impact resulting from satisfier use. Inspection of one's own need net, including network dynamics of need nets constructed over time, may reveal areas for change and growth, and can assist in individual decision making and adaptation.

Need nets also serve as a useful medium for communicating the human experience. Sharing a need net with others can help rapidly communicate what life is like for an individual. Individuals can both provide support to each other and learn from conversations prompted by sharing need nets, both in one-on-one and in larger groups. The creation of an online community to facilitate the creation, contemplation, and sharing of need nets is in development.

Need nets become effective at revealing patterns in social systems through aggregation across individuals. Need nets can be aggregated through a multi-layer network approach, where the need net for each individual can be treated as a separate layer. Individuals providing mutual satisfaction to each other can be connected via inter-layer edges (similar to those in a traditional ego-net). Collapsing the layers, by combining edge weights, for example, results in a single need net that represents the needs and satisfiers of a social system as a whole. Analyzing the system level need net allows researchers to understand the particular role of certain satisfiers (such as video streaming or certain foods) and the prevalence of perceived needs across the social system.

This research presents a novel network method for understanding human needs and satisfiers at the individual level. Need nets have the capability to facilitate individual growth and deeper empathic connections, while serving as a useful medium through which researchers and policymakers can better understand the lives of those in the social systems they nurture.

References

- [1] Hartley Dean. *Understanding Human Need*. The Policy Press, 2010.

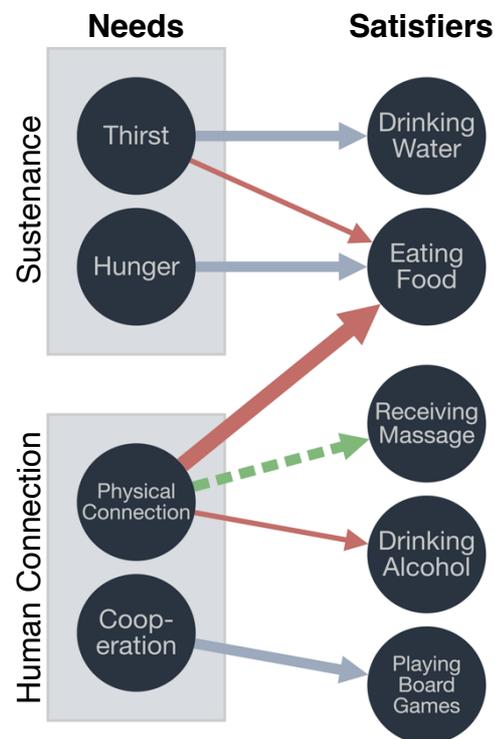


Figure 1. A subset of an example need net created from a need-schema. This network highlights the well-known phenomenon of "eating when thirsty" and "eating/drinking your feelings." The red edges represent undesired need-satisfier relationships, while the green represent desired future relationships.