

# Why people do what they do: An interdisciplinary synthesis of human action theories

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**Understanding why people do what they do is central to advancing equitable and sustainable futures. Yet, theories about human action are fragmented across many social science disciplines, each with its own jargon and implicit assumptions. This fragmentation has hindered theory integration and accessibility of theories relevant to a given challenge. We synthesized human action theories from across the humanities and social sciences. We developed eight underlying assumptions—metatheories—that reveal a fundamental organization of human actions theories. We describe each metatheory and the challenges each best elucidates (illustrated with climate change examples). No single metatheory addresses the full range of factors and problems; only one treats interactions between factors. Our synthesis will help researchers, policymakers, and practitioners gain a multifaceted understanding of human action.**

Keywords: behavior change; models of human action; review; human dimensions; interdisciplinary social science; pro-environmental behavior

# 1 Introduction

Understanding human action is recognized as essential for addressing today’s linked social, ecological, and climate crises (1–5). Yet, theories that seek to explain human action are diverse, numerous, and stem from many disconnected academic disciplines. Each of these disciplines and subdisciplines are underpinned by their own set of (often implicit) assumptions and (often esoteric) vocabulary (e.g., 6). Such inaccessibility has hindered development and application of human action theories to address today’s crises (e.g., climate change). Moreover, the few theories that have been widely used are often applied beyond the contexts in which they are valid and informative (7), 2014). A map that organizes human action theories is therefore crucial for advancing sustainability (including all of its components, e.g., social justice, biological conservation, climate action, environmental protection, human and planetary health).

The isolation of human action theories among disjunct disciplines has hampered scholars from navigating the full range of theories to find those that suit a given case. Consequently, scholars are forced to select the most familiar ‘off-the-shelf’ theory in their discipline or the theory widely used by colleagues (e.g., 8, 9). Familiar explanations for human action are tenacious: when presented with unexplained human action, “the tendency is to commission further studies in the same mold. This results in a self-sustaining paradigm” (10, p. 1276), which may prevent broader investigation of human action. For example, the Theory of Planned Behavior (a psychology theory that posits that individual behavior is determined primarily by one’s perceived control over one’s own behavior and intentions; 11) is often applied to nature conservation, though it may often be unsuitable (7). Studies have shown that while this theory is useful for predicting individuals’ short-term, intended, and self-reported actions in constrained decision spaces, it is unlikely to predict human action more broadly (7, 12). Therefore, the theory is most relevant to a narrow set of conservation problems. Similarly, many other theories are also most relevant for particular contexts, actions, and problems (9). The numerous challenges that require transformative change (13, 14)—rather than short-term, marginal, individual changes—might be best addressed by a wider array of human action theories.

Fragmentation of theories across disjunct disciplines has also constrained expectations about what a solution will look like. For instance, popular theories of behavioral economics, including nudge theory, target behavior change by shifting individual decisions that are often semi-conscious or driven by heuristics (15). E.g., public transportation ridership might be boosted by automatically bundling bus passes with vehicle registration fees (making bus pass purchases default). However, since nudge theory targets semi- or unconscious individual behavior, reliance on this approach omits and may impede attention to crucial institutional and systemic constraints (1). Indeed, a focus on individual behavior overlooks the key role that transformative structural change plays in sustainable trajectories (1, 10). As the adage goes, if you have a hammer, problems look like nails. Increasing the accessibility of the many theories that target both individual *and* structural features (i.e., providing access to more of the toolbox) could hasten the understanding and adoption of solutions to a wide variety of social–environmental problems.

Increasing access to human action theories could also facilitate fertilization across disciplines, likely resulting in more robust and situationally relevant theories. For example, autonomy (the

degree of ownership over one's actions) plays a central role in Self-determination Theory (a theory from educational psychology that seeks to explain intrinsic motivation; 16). But autonomy is absent in another theory, the Extended Parallel Process Model, a communications theory that seeks to explain how fear messages affect health-related behavior (17). Should autonomy also be included in the Extended Parallel Process Model? Or is there something about the context of health-related behavior that makes autonomy unimportant? Without engaging across theories we cannot discriminate between these explanations, nor can we create more robust and relevant theories.

Previous reviews of human action theories have often been limited to a subset of theories, such as those relevant to individual behavior (18, 19) that consciously seeks to better the environment (i.e., pro-environmental behavior; 20), or to individual decisions about energy consumption (21). Important theories about collective action and structural change are thus often overlooked. Even ostensibly full-spectrum reviews have employed search terms and analytic methods that implicitly restricted disciplinary scope. For example, Davis *et al.* (22) assert (as per their discipline) that a good theory must show 'the independence of constructs from each other' (p. 332). While many theories in psychology exemplify this criterion, theories in other disciplines do not. For instance, this criterion excludes practice theories where each cultural and physical element is inextricably linked to others (e.g., technology and meaning interact interdependently to determine water consumption; 23). Other reviews have usefully summarized many relevant theories, but without synthesizing or investigating underlying assumptions (e.g., 24), which diminishes the potential for integration.

To integrate these productive but disjunct areas of work, we analyzed 86 representative and prominent theories of human action from across the human and social sciences. We cast a wide net by including any theory that sought to explain human action, free from constraints related to discipline or assumptions. By inductively characterizing each theory, we developed eight core metatheories (or underlying assumptions) that represent and differentiate all of the original 86 theories. The metatheories we developed transcend academic disciplines and provide a fundamental yet simple organization of human action theories. We describe each metatheory and suggest the types of problems each would best elucidate, including illustrative examples of how each metatheory might be harnessed to address climate change.

## 2 Methods

### 2.1 Defining human action theories

We defined a human action theory as a *description of the relationship between human action and a set of variables*. Our definition is broader than that used in previous studies in four key ways. First, we not only included theories but also models and frameworks (25). Second, we did not require theories to identify unidirectional relationships between input/independent variables and outcome/dependent/response variables. Although other reviews have limited their scope to such one-way relationships (e.g., 26), this assumption excludes many theories from anthropology and sociology. Third, we included both academic books and papers (cf. 22), since different fields rely on different publication formats. Fourth, we intentionally theorized 'action' instead of 'behavior.' Behavior often refers to actions by fully-independent individuals and dominates psychology (e.g., 18, 19, 27), but this term is rare in other disciplines. We therefore theorized 'action' because it has

fewer disciplinary constraints.

## 2.2 Selecting human action theories

We harnessed multiple methods to collect diverse and representative human action theories. We searched Web of Science with (“Theory” OR “Model” OR “Framework”) AND (“Behavior” OR “Action” OR “Practice” OR “Intention” OR “Movement” OR “motivation” OR “Change”) AND (“Human” OR “Social” OR “Person” or “People”). We also conducted targeted searches covering the social science disciplines identified by Bennett *et al.* (28), followed reference chains/used snowball sampling, and consulted with scholars about the dominant human action theories in their respective disciplines. Of these theories, we selected those that appeared seminal or typical of a set of similar theories. This selection process produced 86 theories (see Table 1).

**Table 1.** Human action theories represented in this paper, showing selected sources

| Theory                                    | Source   |
|---|--|
| Action and coping planning                | Carraro and Gaudreau (29)  |
| Affect infusion model                     | Forgas (30, 31)  |
| Anthroparchy                              | Cudworth (32, 33)  |
| Anthropocentrism                          | Devall (34)  |
| Attachment theory                         | Bowlby (35), Ainsworth (36), Hazan and Shaver (37), and Campbell and Stanton (38)        |
| Attitude–behavior correlations            | Kraus (39)   |
| Attitude, behavior, context               | Guagnano <i>et al.</i> (40)  |
| Bureaucratic discretion & constraint      | Tadaki (41)  |
| Causal model theory                       | Waldmann and Dieterich (42)  |
| Cognitive dissonance                      | Festinger (43), Festinger and Carlsmith (44), and Harmon-Jones and Mills (45)            |
| Cognitive hierarchy of human behavior     | Homer and Kahle (46) and Vaske and Donnelly (47)   |
| Collective action frames                  | Benford and Snow (48), Snow and Benford (49), Gamson (50), and McAdam <i>et al.</i> (51) |
| Collective action theory in organizations | Bimber <i>et al.</i> (52)  |
| Compassion fade                           | Västfjäll <i>et al.</i> (53)   |
| Conformity theory                         | Cialdini (54)  |
| Cultural cognition                        | Kahan <i>et al.</i> (55) and Kahan (56)  |
| Cultural evolution                        | Boyd and Richerson (57), Cavalli-Sforza and Feldman (58), and Mesoudi (59)               |
| Cycle of credibility                      | Latour and Woolgar (60)  |
| Deliberative democracy                    | Miller (61) and John <i>et al.</i> (62)  |
| Deterrence theory                         | Beccaria (63) and Pratt <i>et al.</i> (64)   |
| Diffusion model                           | Oberschall (65)  |

|  |  |
|--|--|
| Diffusion of innovations               | Rogers (66) and Greenhalgh <i>et al.</i> (67)                      |
| Domestic practice                      | Hand <i>et al.</i> (23)  |
| Dopamine and addiction                 | Wise and Robble (68)   |
| Eco-Socialism                          | Pepper (69) and Harvey (70)  |
| Ecological rationality                 | Gigerenzer <i>et al.</i> (71)                                      |
| Efficient complexity manager           | Levine <i>et al.</i> (72)  |
| Effort reduction framework             | Shah and Oppenheimer (73)  |
| Elaboration likelihood model           | Petty and Cacioppo (74)  |
| Environmental behavior model           | Hungerford and Volk (75)   |
| Environmental leaders                  | Chawla (76)  |
| Environmental stewardship              | Bennett <i>et al.</i> (77)   |
| Environmentalism of the poor           | Guha and Martinez-Alier (78)                                       |
| Environmentality                       | Agrawal (79)   |
| Exploitation/exploration               | March (80) and Tuncdogan <i>et al.</i> (81)                        |
| Extended parallel process model        | Maloney <i>et al.</i> (17) and Witte (82)                          |
| Five factor model of personality       | Digman (83) and Goldberg (84)                                      |
| Five principles of the whole person    | McAdams and Pals (85)  |
| Foot in the door                       | Freedman and Fraser (86) and Cialdini <i>et al.</i> (87)           |
| Governing the commons                  | Ostrom (88)  |
| Guilt aversion                         | Chang <i>et al.</i> (89)   |
| Habit–intention interactions           | De Bruijn <i>et al.</i> (90) and Gardner <i>et al.</i> (91)        |
| Health action process approach         | Luszczynska and Schwarzer (92) and Schwarzer (93)                  |
| Health belief model                    | Rosenstock (94)  |
| Hedonic principle                      | Freud (95)   |
| Identity and agency in cultural worlds | Holland <i>et al.</i> (96)   |
| Indigenous collaborations              | Reo <i>et al.</i> (97)   |
| Intentional norm change                | Raymond <i>et al.</i> (98)   |
| Intersectional Indian ecofeminism      | Kings (99)   |
| Liberation ecology                     | Peet and Watts (100)   |
| Minority influence                     | Moscovici <i>et al.</i> (101) and Moscovici (102, 103)             |
| Model of ecological behavior           | Fietkau and Kessel (104) (summarized in Kollmuss and Agyeman (20)) |
| Motivation crowding–game theory        | Gneezy and Rustichini (105)  |
| Motivation crowding–norms              | Gneezy and Rustichini (105)  |
| Motivation–hygiene theory              | Herzberg (106)   |
| Multilevel socio-technical transitions | Smith <i>et al.</i> (107)  |
| Narrative theory                       | Polletta (108)   |
| Norm activation model                  | Schwartz (109) and De Groot and Steg (110)                         |
| Nudge theory                           | Thaler and Sunstein (15) and Wilk (111)                            |
| Place/space indigenous identity        | Fredericks (112)   |

|   |  |
|---|--|
| Prospect theory                           | Kahneman and Tversky (113) and Kahneman (114)                              |
| Rational appeal                           | Lindauer <i>et al.</i> (115)   |
| Rational choice theory                    | Morgenstern and Neumann (116) and Becker (117)                             |
| Reasonable person model                   | Kaplan and Kaplan (118)  |
| Regulatory focus theory                   | Tuncdogan <i>et al.</i> (81), Higgins (119), and Zhao and Pechmann (120)   |
| Relationship marketing                    | Morgan and Hunt (121)  |
| Resource-rational analysis                | Lieder and Griffiths (122)   |
| Risk perception attitude framework        | Rimal (123)  |
| Self-affirmation theory                   | Cohen and Steele (124)   |
| Self-determination theory                 | Ryan and Deci (16, 125)  |
| Sense of should                           | Theriault <i>et al.</i> (126)  |
| Shared decision-making                    | Weiss (127)  |
| Social cognitive theory and self-efficacy | Bandura (128)  |
| Social ecology                            | Bookchin (129)   |
| Social intuitionist model                 | Haidt (130)  |
| Social norms                              | Cialdini (54), Schultz <i>et al.</i> (131), and Farrow <i>et al.</i> (132) |
| Social-defense theory                     | Ein-Dor <i>et al.</i> (133) and Ein-Dor and Hirschberger (134)             |
| Socioecological systems framework         | McGinnis and Ostrom (135) and Ostrom (136)                                 |
| Stage model of fear communication         | de Hoog <i>et al.</i> (137)  |
| Strength model of self-control            | Baumeister <i>et al.</i> (138) and Hagger <i>et al.</i> (139)              |
| Systematic/heuristic processing           | Chaiken (140)  |
| Theory of planned behavior                | Ajzen (11)   |
| Thinking fast/slow                        | Kahneman (114) and Tversky and Kahneman (141)                              |
| Transition management                     | Rotmans <i>et al.</i> (142)  |
| Transtheoretical model of behavior change | Prochaska and Vlicer (143)   |
| Value-belief-norm theory                  | Stern (27, 144)  |

### 2.3 Categorizing human action theories

Our approach was ‘grounded’: we inductively identified commonalities between theories and then distilled axes from these commonalities (rather than presupposing the axes that organize theories; 145). This method produced five axes: (i) academic discipline, (ii) unit of action (e.g., individual, collective), (iii) type of action (e.g., volitional behavior), (iv) explanatory logic (i.e., whether the theory was meant to describe action or change action), and (v) sets of foundational assumptions underlying each theory (i.e., metatheory; 146, 147).

We iteratively and inductively categorized all theories along each axis. Specifically, we assigned each theory to an initial category, then combined initial categories into higher-level categories (i.e., focused coding; 145). After creating this preliminary categorization of all theories, we re-analyzed and re-categorized each one (i.e., asked new questions of each theory; 145). Some theories were included in multiple classes (i.e., fuzzy coded). To identify academic discipline, we drew on a combination of author affiliation, journal affiliation, self-identification, and disciplinary jargon.

We illustrated our categorizations using the R package `circlize` version 0.4.13 (148). We calculated the fourth root of the number of times each theory's key source was cited to display the relative citations each theory has received. This measure is only approximate, since theories differ in age, number of sources, and associated citational norms.

Categorization is useful but necessarily imperfect and at times, arbitrary (149). Our emergent categories are neither objective nor pre-existent, but reflect one inductive characterization and synthesis (145, 150). Our characterization of human action theories may reflect our own positionalities as interdisciplinary scholars; The first author, who led the coding, is a White man with broad interdisciplinary training and research in the human and social sciences, as well as in ecology and evolution.

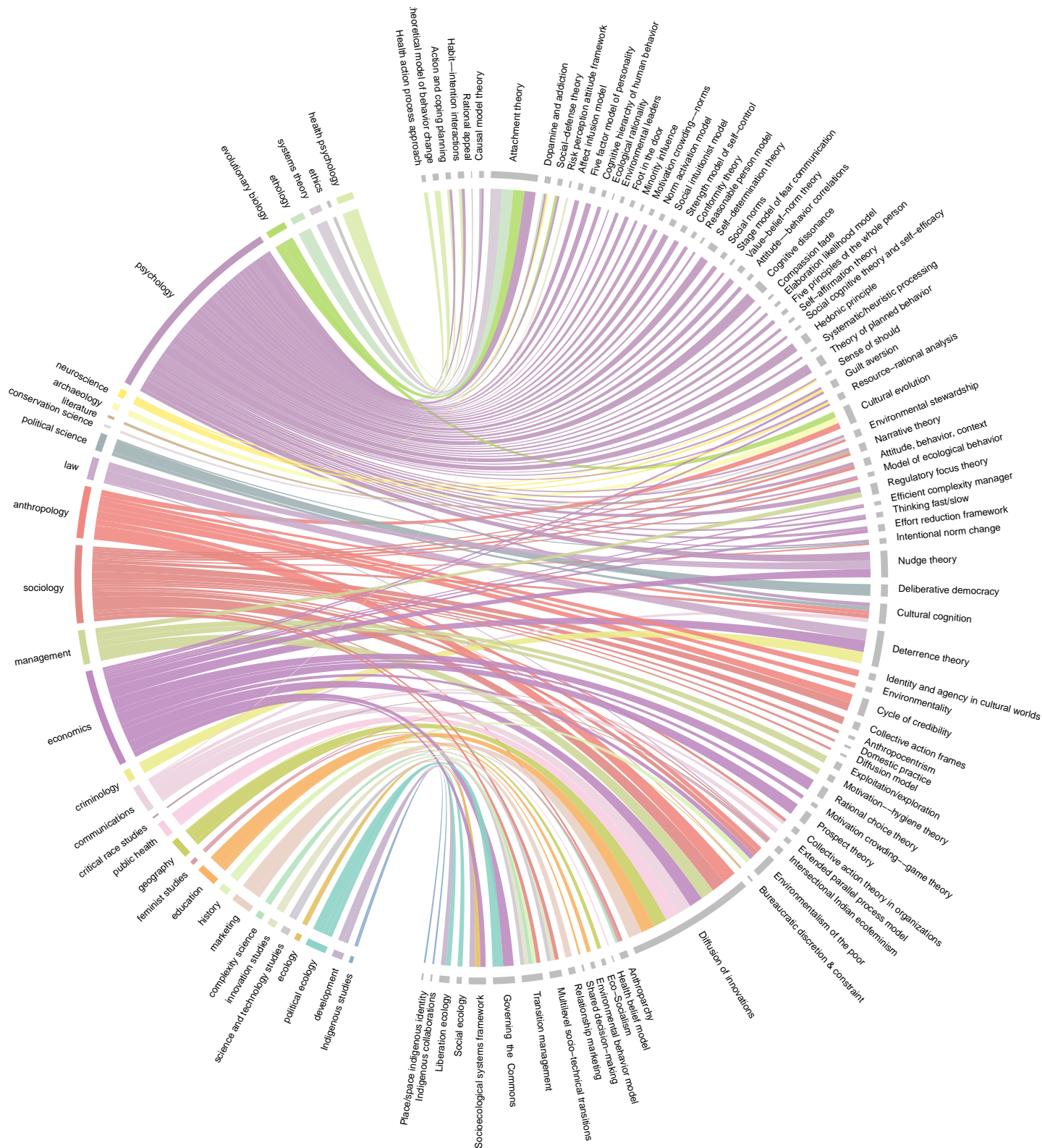
### 3 Many disciplines represented

Our analysis of 86 theories of human action (Table 1) revealed a vast range of topical foci, but also underlying commonalities. Our findings show the breadth of disciplines theorizing about human action and (uneven) cross-fertilization between them (see Fig. 1). Psychology, neuroscience, and economics showed substantial overlap, while psychology and anthropology showed little (Fig. 1). Overall, psychological theories were less interdisciplinary than most other disciplines. This literature suggests an extensive basis for scientists and practitioners to study and enable sustainable action. However, academic discipline was insufficient to organize human action theories and define underlying drivers of human action.

### 4 Eight metatheories: description and application

Our eight emergent and synthetic 'metatheories' represented the baseline assumptions that underlie all 86 theories (Figure 5). Such metatheories inform "...the sorts of questions one asks and does not ask..." (146, p. 98). Metatheories thus dictate which explanations researchers look for: If a human takes action X, the causes could be either Y or Z, or innumerable others. By limiting the causes to Y or Z, metatheories constrain the types of questions asked, the answers obtained, and the implications of these answers (146). However, which metatheory underlies a given theory is often implicit, both to theory-creators and theory-users (147, 151). This implicitness hinders integration of multiple theories (6, 152). Explicating and relating implicit metatheoretical assumptions may help organize, compare, use, and build better theories.

We labeled the eight metatheories developed through our inductive analysis *Independent Self*, *Independent Structure*, *Cognitive Needs*, *Psychological Needs*, *Communal Needs*, *Economic Needs*, *Interdependent*, and *Top-down*. Each of our eight emergent metatheories assumes that a different set of factors generates human action (Fig. 3) and thus enables understanding of a distinct aspect,



**Fig. 1.** Academic discipline(s) (left) associated with each theory (right). The relative thickness of each connector represents approximately how much attention each theory has received (as measured by the fourth root of the number of citations received by the foundational publications). For theory sources, see Table 1.





**Fig. 2.** The relationship between each theory’s academic discipline(s) (left) and metatheory (right). The relative arclength of each metatheory and discipline represents the relative proportion of each within our sample (e.g., *Communal Needs* undergirded more theories than *Independent Structure*). The metatheories, while somewhat aligned with disciplines, represent deeper underlying assumptions that cut across theories and disciplines.

scale, and cause of human action (Fig. 4). For example, as elaborated below, our *Independent Self* metatheory assumes that independent personal attributes, such as attitudes, shape individual short-term action (Fig. 3).

## 4.1 Independent metatheories

The first two metatheories treat the drivers of human action as largely independent: The factors that shape human action are assumed to be independent from each other and from any external factors; these external factors are assumed to be unchanging.

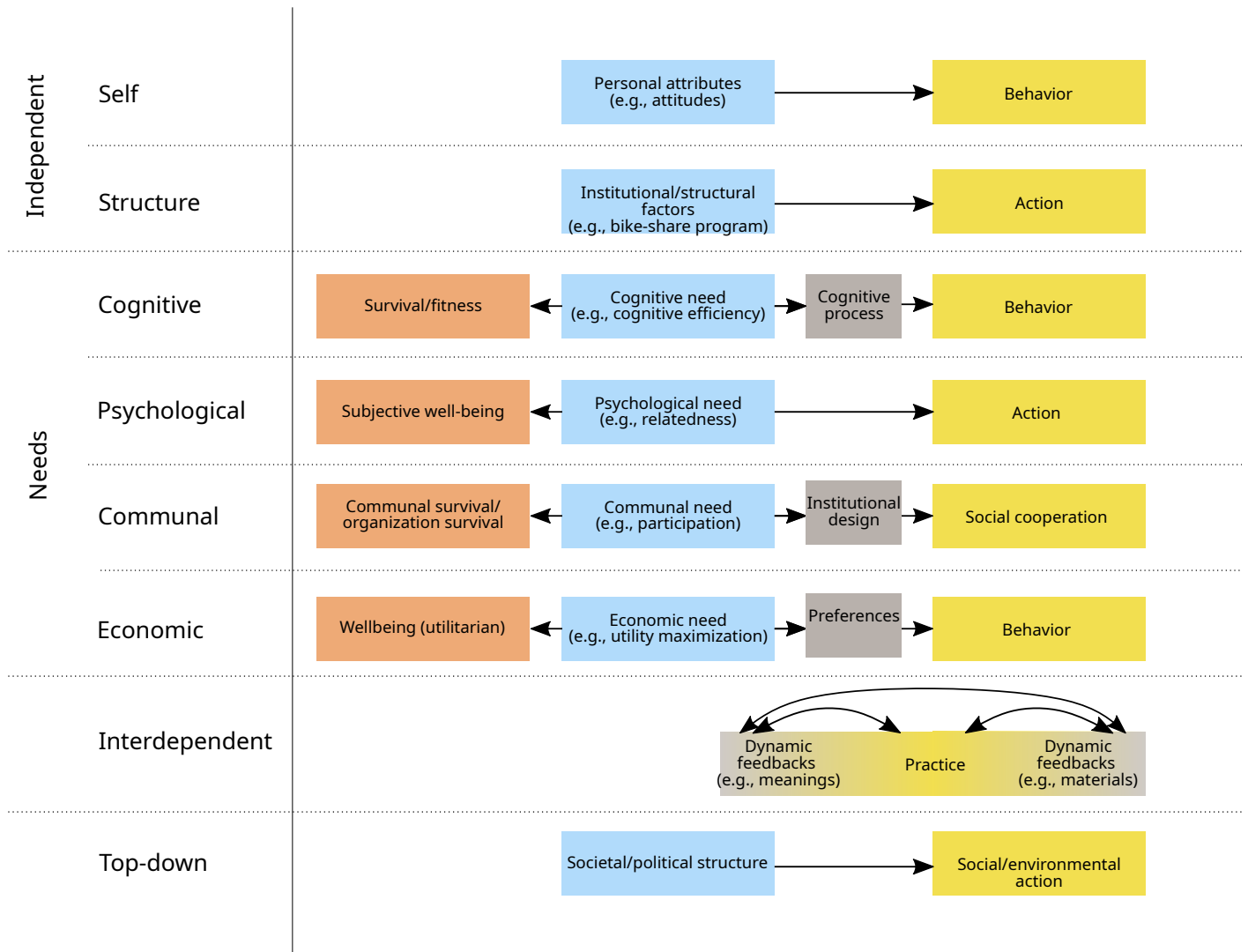
### 4.1.1 Independent Self

The theories in our first metatheory treat individual behavior as shaped by personal characteristics, such as values, attitudes, traits, beliefs, and worldviews, all of which are treated as independent of and unaffected by ‘external’ context and structure (see Fig. 3 and also 10). Personal characteristics are assumed to cause behavior (unidirectionally); these theories do not examine how behavior in turn shapes personal characteristics (bidirectionally). Moreover, although theories may occasionally allude to structural factors, these are not the primary focus of investigation. For example, the Model of Ecological Behavior includes how behavior can be enabled or disabled by external, infrastructural, and economic factors. However, these external factors are treated obliquely or as contextual information, and are not theorized to substantially affect personal attributes (104). While *Independent Self* theories can explain individual short-term choices, they have been criticized for ‘psychologizing’ social problems—i.e., treating a problem as solely a result of individual actions (153). This limited role of structural explanations distinguishes the *Independent Self* metatheory from the *Independent Structure* and *Top-down* metatheories.

This category was prevalent, particularly in psychology, economics, and ethics (see Fig. 2), and contains many of the most widely cited theories, including the Theory of Planned Behavior and Prospect Theory (Fig. 5). These theories are used to both describe and change human action, primarily in relation to individual behavior and decision-making (Fig. 4).

**Action suitability:** Theories in this category are suited to provide short-term, fast, small changes to deliberate behavior (see Fig. 4). Because they assume that context and structures are static, these theories are best applied to populations where everyone experiences similar context and structures, and where those structures are not changeable at the scale of interest (e.g., tomorrow’s dietary choices in a school cafeteria). Thus, it is less appropriate for more substantial and cascading changes, such as transitioning to a degrowth economy (154). The *Independent Self* metatheory is often the default metatheory, and so may be overused (10); before employing these theories, potential users should verify that this metatheory is the most appropriate.

**Example application, climate change:** *Independent Self* theories could tackle greenhouse gas emissions by making small changes to intentional individual behavior of a homogeneous population. For instance, this metatheory could instruct how to modify employee attitudes about the health benefits of bike-commuting, which might incentivize employees who own bikes to bike-commute more frequently. However, because this metatheory is best-suited for tinkering within existing systems, if the existing system is inadequate, this metatheory is unlikely to have much



**Fig. 3.** Simplified diagram showing the structure of each metatheory. Each metatheory makes different assumptions about what drives human action: particular components (blue, gray) are theorized to determine some conception of human action (yellow), which may serve to satisfy particular purposes (orange). Each metatheory draws on different set of factors: the top two metatheories focus on the independent self and structure, respectively. The next four metatheories each focus on a different set of needs, including cognitive needs, psychological needs, communal needs, and economic needs. The seventh metatheory examines often-hidden, systemic factors; the final metatheory examines how multiple factors, and action itself, interact to co-create a practice. Our analysis reveals which metatheories may be most appropriate for different types of solutions, from incremental, fast, and cheap, to systemic and transformative (see Fig. 4).

| Metatheory     | What does it enable?  | Scale of analysis   | Scale of change            | Lever identification           | Applicable population | Implementation speed | Example application to address climate change                        |   |
|----------------|---|---|----------------------------|--------------------------------|-----------------------|----------------------|--|---|
| Independent    | Self  | change individual attitudes towards decisions (structure/context is constant) | small                      | small, incremental             | usually               | homogeneous          | rapid  | create positive individual attitudes towards bike commuting   |
|                | Structure   | change institutions to enable change, holding individuals constant            | medium                     | medium, moderately incremental | usually               | heterogeneous        | variable   | create separated bike lanes; build bike cages.  |
| Needs          | Cognitive   | change cues to harmonize cognitive needs with specific choice (e.g., nudges)  | small                      | medium, incremental            | usually               | heterogeneous        | rapid, cheap   | require parking passes to be manually renewed   |
|                | Psychological   | intrinsically motivate people, which in turn increases subjective wellbeing   | small                      | medium, moderately systemic    | usually               | heterogeneous        | variable   | Redesign institutions to enable people to meet their need for consonance between action and underlying environmental values |
|                | Communal  | create adaptive communal, equitable processes                                 | medium                     | medium, moderately systemic    | usually               | heterogeneous        | slow   | change the organizational structure and processes of a climate activism org.  |
|                | Economic  | change costs of choices within a static, homogeneous system                   | small                      | medium, incremental            | always                | homogeneous          | rapid  | introduce a carbon tax  |
| Interdependent | identify & intervene in dynamic feedbacks that (re)produce social practices | large   | large, systemic & adaptive | sometimes                      | heterogeneous         | slow                 | change competence, availability, meanings, & technology about biking |   |
| Top-down       | identify overarching problem  | large   | large, systemic            | rarely                         | heterogeneous         | slow                 | reorganize nation's political economy                                |   |

**Fig. 4.** Key attributes of each metatheory that inform suitable application, and an example solution each might propose to tackle climate change.

effect. For example, employees may have a positive attitude towards bike-commuting, but if the only route to work is on a busy highway, attitude modification may not increase bike commuting.

### 4.1.2 Independent Structure

Our *Independent Structure* metatheory is analogous to the *Independent Self* metatheory, but it assumes that independent structural factors drive action, rather than personal factors. *Independent Structure* theories assume that differences in cultures, education, learning environments, institutions, infrastructure, and structures drive human action; internal processes and personal characteristics are often unexamined. For example, according to Collective Action Theory in Organizations, available information technology (e.g., email) influences how people can communicate and carry out collective action.

*Independent Structure* theories were quite scarce among our sampled theories (Fig. 5), but were represented in multiple disciplines, including geography and sociology (Fig. 2). These theories are primarily used to understand how to change the action and management of collectives and institutions (Fig. 4).

**Action suitability:** This grouping of theories addresses challenges that require moderate-term, moderately-fast, medium-scale changes (see Fig. 4). It accounts for structural changes, but not feedbacks or interactions among structural factors and personal attributes. Consequently, it is not suited to characterize transformative, cascading changes. Nevertheless, this metatheory typically contains clear structural intervention points, streamlining its application.

**Example application, climate change:** *Independent Structure* theories could lower greenhouse gas emissions by explaining how to modify an institution or structure, while holding everything else constant. For example, these theories might propose to increase biking by creating separated bike lanes and bike garages. However, if people are not otherwise equipped or able (e.g., knowledge to navigate traffic, ability to bike up a hill, experience adjusting gears) to bike, this change may be inadequate because this metatheory does not integrate personal characteristics such as biking knowledge or attitude.

## 4.2 Needs metatheories

Across the next four metatheories, a person's action is theorized as directed towards an ultimate purpose.

### 4.2.1 Cognitive Needs

In theories categorized under our *Cognitive Needs* metatheory, the ultimate purpose of action is survival/evolutionary fitness, which results from the satisfaction of any need associated with the cognitive processing of information (Figures 3). These theories thus assume that human action is directed towards fulfilling cognitive needs. Among our theories, we distilled four such needs: accurate inference (to ensure decisions reflect reality), cognitive efficiency (to ensure limited energy resources are used to maximize effect), information exploitation (i.e., coasting/predictability; to ensure maximum utility of limited information), and information exploration (to accurately ad-

just to changing and unfamiliar environments). These cognitive needs are treated as fundamental, universal human needs necessary for survival.

According to theories in this category, cognitive needs are often connected with particular cognitive processes. Information exploitation and cognitive efficiency are associated with heuristic processing: unconscious, immediate processing that privileges current knowledge and peripheral information (i.e., thinking fast; 114, 140, 155). Conversely, accurate inference and information exploration are associated with systematic processing: slow, energy-intensive processing that privileges the content of new information (i.e., thinking slow; 114, 140, 155)

Cognitive Needs theories were moderately common among our human action theories (Fig. 5), primarily within economics, psychology, ethology, and neuroscience (Fig. 2). Such theories seek to describe and modify individual action and decision-making (Fig. 4).

**Action suitability:** *Cognitive Needs* theories are appropriate for addressing challenges that require short-term, moderately fast, medium-scale changes (see Figure 4). This metatheory is particularly suited to facilitate quick and cheap changes (e.g., through ‘nudges’) (156), although it can apply to longer-term changes (157). Because it makes use of universal cognitive needs, the metatheory may be appropriate for changing the action of heterogeneous populations. Moreover, the metatheory typically contains clear choice intervention points, streamlining implementation. However, supported changes are at the individual level and will likely not address underlying ‘wicked’ problems (158). Moreover, the apparent ease of implementing this metatheory’s solutions may distract from addressing problems at their root (158). However, *Cognitive Needs* metatheory may offer an opportunity for making deeper changes when the influenced individuals are powerful (see examples in 126).

**Example application, climate change:** *Cognitive Needs* theories could instruct how to harmonize cognitive needs with green behavior to lower greenhouse gas emissions (Fig. 4). For example, a solution could take advantage of the cognitive need for efficiency by making it more difficult to buy a parking pass, and easier to get a bike tune-up (e.g., bike mechanics come to your office once every six months and fix your bike while you work; you don’t have to arrange to make an appointment or go anywhere).

#### 4.2.2 Psychological Needs

According to theories in our *Psychological Needs* metatheory, the ultimate purpose of human action is to produce subjective well-being, which results from the satisfaction of psychological needs. Human action can thus be understood as directed towards fulfilling these psychological needs (Fig. 3). Among our theories, we distilled six such needs: relatedness (our most prevalently theorized need; the need to belong to secure relationships), pleasure promotion (the need to explore and approach enjoyable experiences, self-actualization, and to seek out and understand novel arenas), pain prevention (the need to manage and avoid painful experiences), competence (the need for efficacy, and an important feature of ‘flow’ activities; 159), consonance (the need for consistency, including with values, for the world to make sense, and for stable self-identity), and autonomy (the need for ownership over one’s actions—i.e., internal perceived locus of causality; 160). Pleasure promotion and pain prevention are similar to the cognitive needs for information exploration and

information exploitation, respectively (81). However, we categorized these needs into different metatheories because they are theorized to advance different purposes: psychological well-being vs. survival (81, 119, 126). Moreover, while *Cognitive Needs* theories target more unconscious needs, *Psychological Needs* theories center on experienced psychological states. Nevertheless, both sets of theories treat needs as foundational, universal, and unchanging.

*Psychological Needs* theories were more numerous than those of any other metatheory (Fig. 5). These theories stem primarily from psychology, but also many other disciplines, including evolutionary biology, sociology, communications, and management (Fig. 2). With a focus on elevating subjective well-being, this metatheory explores individual behavior change, motivation, well-being, and compliance.

**Action suitability:** *Psychological Needs* theories are flexible and appropriate for addressing a variety of challenges, ranging from short- to long-term and incremental to transformative. For instance, needs for relatedness and competence can be leveraged to shift behavior incrementally towards social norms (161). Recent work has also explored how such individual actions might scale-up to produce transformative change (162). Furthermore, relatedness and pleasure promotion can be harnessed to develop transformative environmental movement leaders (76). The concept of relational values—preferences, principles and values associated with relationships—has also recently been proposed to leverage the need for relatedness towards sustainability (though this value concept also bears similarity to the *Interdependent* metatheory; 163, 164). *Psychological Needs* theories also typically describe mechanisms for increasing human well-being, which may result in more stable and resilient changes (125). Furthermore, because *Psychological Needs* treat needs as universal, it may be appropriate for changing the action of heterogeneous populations. However, by externalizing structure and assuming that people are largely the same, *Psychological Needs* theories may miss key drivers of human action.

**Example application, climate change:** *Psychological Needs* theories might be applied to reduce greenhouse gas emissions by harmonizing psychological needs with green action (Fig. 4). For example, a solution might redesign infrastructure and institutions to facilitate people taking collective action consistent with underlying but latent environmental values (13, 165), thus leveraging needs for both relatedness and consonance.

### 4.2.3 Communal Needs

*Communal Needs* theories are united by an assumed ultimate purpose of social cooperation (e.g., collaboration, collective action, effective governance), resulting from the satisfaction of communal needs (Fig. 3) within particular institutions and cultures. Communal needs are variable, and can parallel psychological and cognitive needs, but we define them as those that are assumed to enable social cooperation, rather than survival or subjective well-being. For example, Narrative Theory suggests that collective action perceived as spontaneous, rather than bureaucratic, can spur action by meeting communal needs for independence (108). This communal need is similar to the psychological need for autonomy (16, 125), but while psychological needs and cognitive needs are usually treated as universal and culturally-independent, communal needs are treated as i) more specific to the particular type of cooperation, culture, or institution, and ii) enabling communal cooperation rather than individual wellbeing. For example, Narrative Theory makes this cultural-

specificity explicit: “...narrative’s dependence on a limited stock of culturally resonant plots—on a canon—emphasizes the *constraints* levied by dominant cultural understandings” (emphasis in original, 108, p. 142).

Our *Communal Needs* metatheory was relatively uncommon among our human action theories (Fig. 5). This metatheory was most prevalent in sociology, but also in marketing, Indigenous studies, political science, and education (Fig. 2) where it was used to understand how to create cooperation and collective and institutional action.

**Action suitability:** This metatheory is appropriate for institutional challenges that require long-term, moderate to transformative changes (Fig. 4). This metatheory helps make institutions and groups more cooperative and successful through the satisfaction of communal needs, such as equity and ownership (61). When confronted with a cooperation or collective management problem, this metatheory is most suitable. Furthermore, most of the represented theories provide clear prescriptions for how to intervene. However, entrenched power structures may prevent the satisfaction of communal needs, or limit the power of such groups.

**Example application, climate change:** This group of theories is appropriate for helping groups organize, encourage participation, and bolster the collective adoption of new practices (Fig. 4). For example, this metatheory might be used to adapt to climate change by building groups that can organize in anticipation of climate disasters, such as rising sea levels. Specifically, a *Communal Needs* theory could show how to instill feelings of ownership and independence within a climate activist group to enhance its effectiveness and grow its membership.

#### 4.2.4 Economic Needs

*Economic Needs* theories share the assumption that the ultimate purpose of action is to maximize utilitarian wellbeing (i.e., utility). Unlike the subjective well-being of *Psychological Needs*, this well-being is objective, reflecting the utilitarianism of Jeremy Bentham and John Stuart Mill (166). In this conception, well-being necessarily results from making choices that satisfy preferences (167), rather than referring to a particular subjective state, as in *Psychological Needs* (168). This metatheory thus treats humans as rational utility-maximizers with preferences that dictate their choice of various alternatives (Fig. 3). Preferences are typically assumed to be exogenous: independent of markets, choice architecture, and context. In this independence, *Economic Needs* is similar to our *Independent* metatheories.

Our *Economic Needs* metatheory was relatively uncommon as an explicit theory among our scientific human action theories, although it may underpin many public policies and associated frameworks (169). This metatheory was widely adopted in economics, law, and criminology (Fig. 2) where it was exploited to understand how to modify individual behavior and decision-making. Although focused on individual action, this metatheory is concerned with how these individual actions scale up to collective action. Our *Economic Needs* metatheory thus often treats individuals as undifferentiated and substitutable.

**Action suitability:** This metatheory is appropriate for addressing rapid, marginal changes within the dominant socio-economic systems of many nations. A key benefit of *Economic Needs* is its



clear prescription of interventions (e.g., change prices or incentives). However, if the problem stems from the system itself, this metatheory's prescriptions may be insufficient (69, 170, 171). Furthermore, the well-being, preference, and valuation components of this metatheory have likely been applied more widely than appropriate given its restrictive assumptions (72, 172–175)

**Example application, climate change:** *Economic Needs* theories might be applied to reduce greenhouse gas emissions by changing marginal costs and benefits. For example, this metatheory might propose subsidizing bike or electric vehicle prices, or initiating a carbon tax. However, *Economic Needs* theories are ill-suited to fundamentally address climate change when political economic systems are themselves built on assumptions of nature domination, instrumental use, endless growth, and corporate power (170, 171). Like the *Independent Self* metatheory, *Economic Needs* theories are likely over-applied. Given the systemic nature of the climate–ecological–inequity crisis, *Economic Needs* theories alone are unlikely to generate lasting solutions. Nevertheless, they have a role to play in tackling numerous smaller-scale problems.

### 4.3 Top-down

Theories in our *Top-down* category expose the often hidden, implicit systemic causes of human action. From cultural systems of patriarchal domination to anthropocentrism (33), this metatheory examines the largest and most systemic drivers of human action. *Top-down* theories posit that personal characteristics and individual actions result from a range of top-down factors, including culture, beliefs, economic systems, political systems, wealth distribution, etc. This causation is assumed to be largely uni-directional: top-down factors are rarely treated as influenced by individual actions, in contrast to our *Interdependent* metatheory. *Top-down* is similar to *Independent Structure*, except the former examines higher level and more dominant (i.e., hegemonic) structures.

*Top-down* was less represented than other metatheories (Fig. 5). These *Top-down* theories stem primarily from critical scholarship within political ecology, critical geography, feminist studies, and sociology (Fig. 2). These theories are primarily used to understand how to change societal and institutional action (Fig. 4)

**Action suitability:** *Top-down* theories are appropriate for large systemic problems that cannot be solved by incremental changes within a system. However, while this metatheory is useful for identifying underlying systemic issues (32, 170, 176) and imagining transformational futures, theories within rarely prescribe specific interventions necessary to achieve transformative change. Thus *Top-down* theories are most appropriate for identifying sustainable futures and the underlying factors preventing their realization, but other metatheories (such as *Psychological Needs* and *Communal Needs*) may be more effective for determining how to achieve said sustainable futures.

**Example application, climate change:** *Top-down* theories might be applied to reduce greenhouse gas emissions by identifying the systemic factors that have generated the current climate crisis and impeded its resolution. For example, our metatheory might identify nature domination, instrumental use, endless growth, and corporate power that undergird our current political–economics system (177). Other metatheories might then be marshaled to determine how to reform or overturn these systems, such as through social movements (102, 108).

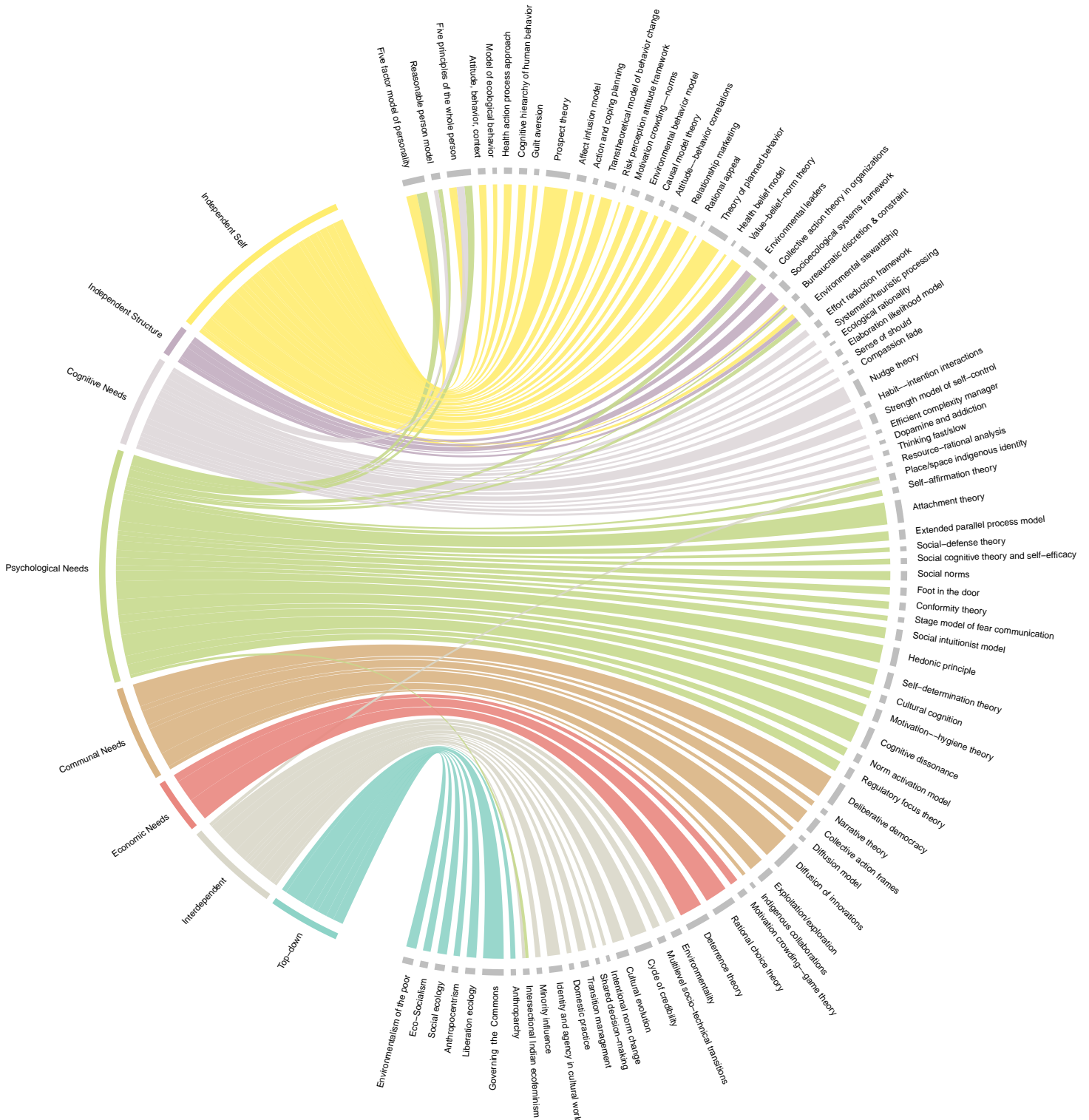
## 4.4 Interdependent

*Interdependent* theories treat human action as continually created, reinforced, or eroded by an interdependent web of values, identities, positions, habits, goals, needs, experiences, meanings, institutions, cultures, and politics, etc. In turn, this interdependent web of factors is continually created, reinforced, or erased by human actions (96, 178). For example, this metatheory assumes that a person's actions might be influenced by their position in society (e.g., as poor or stigmatized within the dominant cultural milieu), even while those people might act to challenge or resist those norms, or to innovate social alternatives that become new norms over time. Thus, the key characteristic of this metatheory is the co-developed interdependency of the constituent factors and the action (10, 179–182). Our *Interdependent* metatheory thus differs starkly from other metatheories, which assume that input/independent variables cause (but are not in turn caused by) changes in a dependent/response/outcome variable.

Our final metatheory was moderately prevalent (see Fig. 5), primarily within sociology and anthropology, but also critical race studies, Indigenous studies, feminist studies, science and technology studies, and others (Fig. 2). Theories within this category generally focus on understanding accustomed, habitual, or accepted ways that people do things, at the scale of communities and regions (i.e., practice).

**Action suitability:** This group of theories is appropriate for addressing challenges that are complex, uncertain, and interlinked. While all other metatheories focus on isolated drivers of human action, this metatheory investigates interactions among multiple drivers. *Interdependent* theories treat values, needs, structures, and systems as dynamic and are therefore well positioned to expose causes of human action that may be taken-for-granted. While explicitly embracing feedbacks, interactions, and the attendant uncertainty, however, this metatheory rarely provides clear prescriptions for change or predictions of outcomes. Furthermore, the lack of quantitative focus among *Interdependent* theories has prevented precise analyses of particular interactions. These issues challenge the operationalization of *Interdependent* theories. Wider scientific and policy engagement with this metatheory might help address these challenges.

**Example application, climate change:** *Interdependent* theories might inform how to reduce greenhouse gas emissions by simultaneously and adaptively changing the factors underlying human action (183). For example, one might cultivate the practice of bike-commuting with multi-pronged focus on competence (e.g., through bike classes and bike-repair workshops, positive feedback, support from friends, incentives to try it at least once), availability (via a free city-wide bike-share program and ample bike racks at popular locations), meanings (by associating bike-commuting with responsibility for the environment, and care for others who depend on the environment) and technology (prioritize street design for cyclists, not cars). As this example demonstrates, *Interdependent* theories may describe more complicated interventions. Nevertheless, such descriptions may enable sustainability scholars and practitioners to appreciate the full range of possible factors and prepare for uncertainties. Once the salient interactions are understood, other metatheories may aid implementation.



**Fig. 5.** Our mapping of theories (right) onto the emergent metatheories underlying each (left). The relative thickness of each connector represents approximately how much attention each theory has received (as measured by the fourth root of the number of citations received by the foundational publication).

## 5 Knitting theories together

We inductively developed eight metatheories that underlie theories of human action. Each metatheory examines different factors and makes different assumptions about the causes of human action. Despite such differences, each metatheory is ‘true’ in a sense, reflecting a particular slice of human action. For example, the *Independent Self* metatheory asks how proximate, personal attributes might affect human action. In contrast, the *Cognitive Needs* metatheory asks how evolutionary goals of survival shape human action. These distinct questions define different aspects of human action in different situations. Given the central role that human action plays in social and environmental changes (184), and solutions (e.g., behavioral wedges, 5), our findings may help scholars steer towards better outcomes by leveraging a broader array of theories.

Advancing sustainable futures—in reference to environmental and social health, justice, etc.—is complex and includes many overlapping and interlinked human action contexts (13). Ultimately, most grand challenges facing society cannot be answered by a single theory or scholarly approach, but rather by a strategic combination of several complementary approaches. Changing human action is recognized as a chief aspect of addressing such challenges. For example, the United Nations’ integrative environmental report, *Making Peace with Nature* recognized that “All [collective and individual] actors have a role to play in the transformations needed to achieve a sustainable world” (185, p. 133).

Despite the breadth of action and actors, too often only narrow sets of theories are leveraged for application. For example, the Global Biodiversity Outlook 3 describes many types of human action that are necessary, including “...direct action to conserve biodiversity...” and “Take full advantage of opportunities to contribute to climate change mitigation...” (186, p. 86). However, the report relies solely on the *Economic Needs* and *Independent Self* metatheories to enable biodiversity conservation. Specifically, the report relies heavily on a combination of pricing and fiscal policies (*Economic Needs*), and education and dissemination of scientific knowledge (*Independent Self*) (186). The assumption seems to be that people are independently selfish (contrary to *Psychological Needs* and *Communal Needs*) and that larger economic systems are best left intact (contrary to *Top-down* and *Interdependent* metatheories). While both the *Economic Needs* and *Independent Self* metatheories may provide important insights into addressing the biodiversity crisis, relying on only two of the eight metatheories would constrain conservation efforts.

Those of us studying and working to enable environmental and social health might do well to look beyond theories that seem to suit narrowly defined problems. Rather, we might use multiple theoretical lenses—representing diverse metatheories—to grasp the ways that other disciplines and scholars understand human action, the nature of the evidence consulted, and the applicability of their theories and findings. Adopting trans-, multi-, and interdisciplinary research programs, knowledge, communication, networks, and funding structures will be essential to advancing and applying human action theories (187, 188, indeed, one might apply our human action theories to a study of how to increase interdisciplinarity). Some interdisciplinary theorists have begun to profitably incorporate multiple metatheories (e.g., 41, 77). Specifically, Tadaki (41) integrated *Psychological Needs*, *Independent structure*, and *Interdependent* metatheories to understand the actions of New Zealander water regulators. Our synthesis provides an accessible starting place for scholars and practitioners to develop interdisciplinary fluency.

Most theories found assume a simple independent–dependent variable relationship (seven of eight metatheories). This widespread assumption omits feedbacks and interdependent relationships that are crucial to systems analysis and sustainability (189, 190). Including feedbacks, as the *Interdependent* metatheory does, is particularly important as pandemics, climate change, and other threats highlight nonlinear and complex environmental relationships.

Our analysis of human action theories is preliminary. While we sought to include a wide range of disciplines and publication formats, search engines are such that we may have been more likely to undersample from disciplines that often publish in books (such as anthropology and other disciplines that focus on culture) rather than in journals (such as psychology). Moreover, our analysis did not include human action theories from history, literature, and some other Arts and Fine-Arts disciplines (e.g., 191), and may have undersampled from literatures where the connection to action is more obliquely stated (but still important). We also excluded folk and layperson understandings of human action (192) and undersampled from theories published in non-English (193) and from Indigenous accounts of why people do what they do (e.g., 112). Broadening the scope of analysis is an important future direction. Finally, as noted earlier, our metatheories are products of academic work, which has long prioritized a focus on cognition, social structure and culture as an explanation for human action, at the exclusion of possibilities still emerging.

## 6 Conclusion

While human action is indisputably at the center of pressing global crises, relevant theories are splintered across disciplines with little communication across. Fundamental assumptions vary among these disciplines, impeding the interpretation of findings between disciplines and creative cross-fertilization. Our preliminary identification of eight synthetic metatheories enables scholars and practitioners to navigate among these theories to select theories appropriate in different contexts and at different spatial and temporal scales. Only a synthetic understanding of human action can yield robust and multifaceted insights into why people do what they do, and how that might change or be changed.

### Summary Points

- No single set of human action theories is sufficient to address the range of problems obstructing sustainable futures.
- Eight sets of assumptions—i.e., metatheories—represent and differentiate human action theories.
- These metatheories transcend academic disciplines and provide a simple yet deep organization of human action theories.
- Each metatheory is best suited for a particular type of problem.
- Sustainability solutions may be most effective when they combine insights from multiple metatheories.

- Our analysis reveals that most theories assume a simple independent–dependent variable relationship. This widespread assumption prevents the inclusion of feedbacks and interdependent relationships that are crucial to systems analysis and sustainability.
- Feedbacks are particularly key as pandemics, climate change, and other threats highlight nonlinear and complex environmental relationships.

### Future Issues

- Future research could test how different metatheories may complement each other to provide more robust solutions to real problems. Do solutions that incorporate multiple metatheories lead to better outcomes?
- How prevalent are applications of different theories and metatheories? Future research might test the dominance of various theories and metatheories in particular fields, applications (e.g., biodiversity conservation), reports (e.g., IPCC), and institutions (e.g., US criminal justice system).
- History, rhetoric, international relations, and many other fields in the Arts contain explicit and implicit assumptions about human action, but fell outside the scope of this paper. How do assumptions from these fields map onto our metatheories?
- How do layperson assumptions about human action and NGO theories of change map onto our metatheories? A better understanding of how science and scientific knowledge of human action fits into the cultures and worldviews of laypeople and institutions is an important area for future research.

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### Terms and Definitions

- **Human action:** an umbrella term for a broad range of concepts, including conscious and unconscious decision-making, volitional and nonvolitional behavior, pro- and anti-environmental action, motivation, environmental management, pro-social and anti-social behavior, cooperation and conflict, social movement, movement recruitment, societal transitions, cultural norms and practice, habits, compliance, and many others. Action can be done by many different entities, including individuals, groups, relationships, institutions, societies and others.
- **Human action theory:** a description of the relationship between human action and a set of variables deemed to explain that action.

- **Metatheory:** The baseline, often implicit, assumptions that underlie theories; the assumptions about where to look for answers and what attributes might be important; a theory about theories.
- **Grounded theory:** inductive identification of commonalities and differences between different elements (in our case, theories), from which one can then distill organizing categories (in our case, metatheories).
- **Dependent, independent, and interdependent variables:** Independent variables (also called ‘response variables’) are treated as being unaffected by other measured variables. Dependent variables are treated as being at least partially determined by other measured variables. In traditional models, variation in a dependent variable explains variation in an independent variable (e.g., rising CO2 levels explain the rise in global temperature). Interdependent variables are those where a change in one variable both 1) causes changes in the other and 2) is caused by changes in the other (189).
- **Independent Self metatheory:** a metatheory developed in this paper that treats individual behavior as shaped by personal characteristics such as values, attitudes, traits, beliefs, and worldviews, all of which are treated as independent of and unaffected by ‘external’ context and structure.
- **Independent Structure metatheory:** a metatheory developed in this paper that treats individual behavior as shaped by structures such as culture, institutions, infrastructure, and technologies, all of which are treated as independent of and unaffected by internal processes and personal characteristics.
- **Cognitive Needs metatheory:** a metatheory developed in this paper that assumes that the ultimate purpose of human action is survival/evolutionary fitness, which results from the satisfaction of any need associated with the cognitive processing of information.
- **Psychological Needs metatheory:** a metatheory developed in this paper that assumes that the ultimate purpose of human action is to produce subjective well-being, which results from the satisfaction of psychological needs.
- **Communal Needs metatheory:** a metatheory developed in this paper that assumes that social cooperation (e.g. collaboration, collective action, effective governance), can be created by the satisfaction of any number of communal needs.
- **Economic Needs metatheory:** a metatheory developed in this paper that assumes that the ultimate purpose of action is to maximize utilitarian wellbeing (i.e., utility). Unlike the subjective well-being of Psychological Needs, this well-being is objective, reflecting the utilitarianism of Jeremy Bentham and John Stuart Mill.
- **Top-down metatheory:** assumes that often-hidden, systemic factors unidirectionally shape human action.
- **Interdependent metatheory:** a metatheory developed in this paper that assumes that Interdependent theories treat human action as continually created, reinforced, or eroded by an





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