

Practical Reasoning Using Values*

Giving Meaning to Values

T.L. van der Weide, F. Dignum, J.-J. Ch. Meyer,
H. Prakken, and G.A.W. Vreeswijk

University of Utrecht
{tweide,dignum,jj,henry,gv}@cs.uu.nl

Abstract. Each person holds numerous values that represent what is believed to be important. As a result, our values influence our behavior and play a role in practical reasoning. Various argumentation approaches use values to justify actions, but they assume a function that determines what values a state or action promotes and demotes. However, this is often open for debate, since values are abstract and can be interpreted in many ways. After giving an overview of how values are defined in social psychology, this paper defines values as preferences and introduces several argument schemes to reason about preferences. These schemes are used to give meaning to values and to determine whether values are promoted or demoted. Furthermore, value systems are used for practical reasoning and allow resolving conflicts when pursuing your values. An example is given of how the new argument schemes can be used to do practical reasoning using values.

1 Introduction

People evaluate and select behavior that maximizes harmony with their values [1,2]. When discussing what to do, arguments concerning values can play a significant role. Recent research [3–5] investigates how values can be used in argumentation. However, the concept of values is considered to be ambiguous [6, 7]. For example, some consider values as goals [2], others as attitudes [8]. One of the aims of this paper is to define the concept of values clearly and to show how it relates to goals as used in the agent literature.

Existing approaches [3,4] assume a function that determines what values are promoted and demoted given a state transition. For example, dropping a friend off at the airport promotes friendship. However, this function is typically not straightforward and its outcome depends on an argumentation process. This corresponds to Perelman arguing that when people disagree, they discuss the meaning to be given to values [9].

Another aim of this paper is to provide argumentation schemes that allow elaborate discussions concerning values. Our running example in this paper is a

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dialogue where values play a significant role. In this dialogue, the values *health* and the hedonistic value *fun* play a role. This dialogue is used to illustrate that argumentation concerning values is needed.

Example 1. Consider the following dialogue between A and B:

A1: You should exercise twice a week because it improves your health.

B2: Why is it good for my health?

A3: Because exercise improves your stamina.

B4: But then I might as well go to work by bike.

A5: No, exercising is better for your health.

B6: But exercise is boring.

A7: What is more important: your health or having fun?

B8: I find my health is more important. I guess I should exercise.

In moves A1-A3, we can see a discussion about whether exercise promotes the value of health, which allows B to propose to bike to work in B4. When one considers more aspects of being healthy, a discussion about what is healthy. Considering more aspects of being healthy allows a more extensive discussion. Taking more aspects of being healthy into account, allows elaborate discussions. Furthermore, states can be compared from a value perspective as can be seen in A5. Finally, B6 shows that one cannot always promote all values and priorities between values can be used to solve such conflicts in B8.

This paper is structured as follows. In section 2, we will illustrate the concept of values by giving definitions of values from social psychology and arguing how values relate to goals as used in the BDI literature. In section 3, we will introduce the concept of perspective and influence, which are used to define values. Furthermore, we show how these definitions relate to existing work. Section 5 applies the introduced argument schemes on the running example and we will end the paper with conclusions and future work in section 6.

2 What Are Values?

The concept of value is considered ambiguous and efforts have been made to clearly define it [6, 7]. However, there is a consensus on five common features of values [10]: values are (a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are ordered by relative importance. These features have been incorporated by the Schwartz Value Theory (SVT) [2], which is based on [1]. We will use the SVT because it is seen as the state-of-the-art value theory [6].

Values are defined as *desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity* [2]. This definition will be the basis for our formalization. In the remainder of this section, we will summarize the SVT and compare it to the concept of goals as used in the BDI literature [13, 14]. In section 3, we will define values formally.

2.1 Schwartz Value Theory

In [2], ten motivationally distinct broad and basic values are derived from three universal requirements of the human condition: needs of individuals as biological organisms, requisites of coordinated social interaction, and survival and welfare needs of groups. These ten basic values, also called value types, are intended to include all the core values recognized in cultures around the world and are the following: self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism. Basic values are associated with specific values when promoting the specific value, promotes the central goal of the basic value. For example, the basic value *power* is defined as *social status and prestige, control or dominance over people and resources* and expresses social superiority, esteem, and avoiding or overcoming the threat of uncertainties by controlling relationships and resources. Specific values associated with the *power* basic value are social power, authority, and wealth.

The Schwartz Values Theory explicates dynamic conflict and harmony relations between the ten value types. For example, pursuing the value of being successful (achievement type) typically conflicts with the value of enhancing the welfare of others (universalism type), and pursuing the value of novelty (stimulation type) and change typically conflicts with values of tradition. In contrast, pursuing tradition values is congruent with pursuit of conformity values. Evidence for this theoretical structure has been found in samples from 67 nations [11].

2.2 Interpretation of Schwartz Value Theory

Schwartz defines values as guiding principles. We interpret a guiding principle as a goal that may or may not be achievable, does not change over time, and can be promoted to different degrees. A value is a construct that evaluates states and consequently can be used to evaluate state transitions. Following [3, 12], we say that the transition from state s to state t promotes a value when that value is satisfied to a higher degree in t than in s . For example, the value *world peace* is not achievable, but we can say that in one state there is more world peace than in another state. When actions are seen as state transitions, you can evaluate actions by the degree in which your values are promoted. Furthermore, values are relatively stable over time. When someone tries to promote his/her values maximally or in other words, someone acts in order to achieve a state that is evaluated highest from his/her values, we say that his/her values serve as guiding principles.

We interpret a value being *trans-situational* as that a value is not limited in the situations to which they can be applied. Whether you can determine if a state transition promotes a value, does not depend on time, place, or objects. For example, the goal to bring your car to the garage tomorrow is not a value because it specifies a time, (tomorrow) a place (the garage), and an object (your car).

Each person holds numerous values. However, in the pursuit of all values conflicts can arise. We interpret values varying in importance as how people deal with situations of conflicting values. For example, when a person finds honesty more important than success and has to choose between lying to be successful or being honest and not successful, then this person will choose to be honest. A value system helps one to choose between alternatives, resolve conflicts, and make decisions [1].

Schwartz's definition does not state whether the values someone holds have to be consistent. We argue that someone's values have to be consistent, since it seems unrealistic that one finds both v and $\neg v$ important, e.g., people do not value both being healthy and being unhealthy. However, it is possible that someone believes that pursuing a combination of values is impossible. For example, when you believe that success requires lying, you cannot pursue both honesty and success. In this case, promoting one value will typically demote the other.

2.3 Values and Goals

Schwartz defines values as desirable trans-situational goals, but how does Schwartz's use of the concept of goal relate to goals as used in the traditional agent literature? For easy reading, we will call the concept of goals as used in the traditional agent literature *BDI goals*.

In [13, 14], artificial agents have desires and BDI goals, both represented as states of the world. The set of desires can be inconsistent, e.g. I desire to be on Hawaii and to be skiing, which is impossible because you cannot be at two places at the same time. The set of BDI goals that an agent adopts must be consistent and achievable, which means that that agent has plans that achieve those BDI goals.

BDI goals are not trans-situational, because when the time, place and objects are not specified, one cannot check whether it is achievable. People do not stop trying to promote their values, so in this respect, values are similar to maintenance goals. For example, if you value honesty, then you want to be honest at all times. In addition, values can be unachievable and vary in importance unlike BDI goals. Consequently, values as defined by Schwartz cannot be represented by goals as defined in the agent literature, since the nature of values is different from the nature of BDI goals.

3 Formalizing Value Systems

Perelman argues in [9] that when people disagree upon a decision, they discuss apropos the applicable rule, the ends to be considered, the meaning to be given to values, the interpretation and characterization of facts. This section shows an approach that can be used to give meaning to values in dialogues.

Why do values need to given meaning? In our opinion, values are typically abstract and when concrete situations are evaluated, abstract values need to be interpreted in these concrete situations. This interpretation gives meaning to a

value and can be difficult. For example, it is difficult to determine whether the value happiness is promoted, since it can be unclear what happiness is.

A Value-based Argumentation Framework (VAF) contains a function *val* mapping arguments to values [4]. If $val(a) = v$, then accepting argument *a* promotes or defends value *v*. This function *val* gives meaning to values. The approach in this section enables reasoning about whether an argument promotes a value.

How can meaning be given to values? In other words, how can the satisfaction of our values be evaluated in a given situation? We argue that to give a value meaning, people give conditions that must be satisfied in order to promote a value. For example, one must treat people the same to promote the value of equality, or exercising promotes the value of being healthy.

An important observation is that both conditions as well as values can typically be promoted in degrees. For example, not exercising at all is not healthy, exercising once a week is healthy, but exercising twice a week is even healthier. This corresponds to mapping a state transition and a value to either *promote*, *neutral* or *demote* as done in [12]. For example, the transition from not exercising at all to exercising once a week and the value of health would map to *promote*, whereas the transition from exercise twice a week to not exercising at all and the value of health would map to *demote*. We will introduce the notion of perspective to talk about both conditions and values.

Following [3, 8], we define our notions using states. We assume a set *S* of states and we will denote single states with *s* and *t*. We will also introduce a number of argument schemes and associate critical questions and their corresponding attacks. We will not include critical questions and attacks that are directed at the premises.

In section 3.1, the notion of perspective is defined and in section 3.2, we define the notion of influence to give meaning to perspectives. In section 3.3, we will define values and agents' preferences using these notions. We will conclude this section with a small discussion. In section 4 we will define argument schemes for practical reasoning which builds upon the argument schemes introduced in this section.

3.1 Perspectives

We will introduce the notion of perspective to express that states can satisfy a perspective to multiple degrees. When a state transition results in higher satisfaction of a perspective *p*, that transition promotes *p*. Likewise, when the transition results in a lower satisfaction, the transition demotes the perspective. For example, success can be satisfied in multiple degrees, e.g. graduating promotes being successful, but graduating cum laude promotes success even more.

Definition 1 (Perspective). *A perspective p is a preorder on states, denoted with \leq_p . We will use p, q, r to denote perspectives. When $s \leq_p t$ (with s and t worlds), we say that t is at least as preferred as s from perspective p .*

Equivalence is defined as $s \equiv_p t$ iff $s \leq_p t$ and $t \leq_p s$. When $s \equiv_p t$, we say that s and t are equally preferred from perspective p . The strict order is defined as $s <_p t$ iff $s \leq_p t$ and $\neg(s \equiv_p t)$. When $s <_p t$, we say that t is preferred over s from perspective p .

Example 2. Our running example, example 1, contains four perspectives: exercise (called e), health (called hl), stamina (called st), and fun (called f). Furthermore, let exercise twice a week be the state $e2w$, the current situation be state cur , and biking to work be state $bike$. Then move A1 is $cur <_e e2w$, move B4 is $cur <_e bike$, and move A5 is $bike <_e e2w$.

3.2 Influence

When we do not know which of two states is preferred from a perspective, then we can try to infer that information. In this way, we give meaning to the perspective. We argue that this is often done in arguments. For example, when discussing whether something is healthy, we use information like exercise has a positive influence on health or that success makes you happy.

To give meaning to a perspective, we introduce the notion of influence. When perspective p positively influences perspective q , then this means that when a state is better from p , then in general, it also is better from q . For example, in general, having success positively influences happiness and in general, being healthy positively influences happiness. In this example, success, health, and happiness are perspectives. Because we say that it is the case in general, we cannot deductively infer more happiness in situations with more success. For example, because that situation may be unhealthy.

Definition 2 (Influence). *We denote that perspective p positively influences perspective q with the notation $p \uparrow q$. Similarly, we denote that p negatively influences q with $p \downarrow q$. The argument scheme to reason with influence is in table 1.*

Table 1. Argument Scheme to Propagate Influence: ArgInfl

Premise	p positively influences q	$p \uparrow q$
Premise	t is better than s from p	$s <_p t$
Conclusion	t is better than s from q	$s <_q t$
	Critical Question	Attack
Alternative	Is q influenced by other perspectives?	$r \uparrow q$ and $t <_r s$, so $t <_q s$

With the notions of perspective and influence, we can defeasibly infer preferences from a perspective, even when the preferences are specified incompletely.

This corresponds to Searle’s observation that preference orders are typically not given, but are the product of practical reasoning [15].

Example 3. When we know that state t is preferred to state s from perspective p , i.e. $s <_p t$, and that p positively influence perspective q , i.e. $p \uparrow q$, then we do not know whether t is preferred to s from q , i.e. $s <_q t$. However, we can construct an argument using argument scheme ArgInfl as follows:

$$\frac{s <_p t \quad p \uparrow q}{s <_q t} \text{ ArgInfl} \quad (1)$$

When we would also know that perspective r positively influences q , but that s is preferred to t from r , then in the same way, we can use ArgInfl to construct an argument that rebuts the previous one. When arguments conflict with each other, argumentation frameworks can be used to determine which argument defeats the other, for example because one argument is stronger or preferred.

Example 4. In our running example, move A1 states that exercise positively influences health, i.e. $e \uparrow h$ and that B would exercise more when exercising twice a week, i.e. $\text{cur} <_e \text{e2w}$. These two statements are used to conclude that exercising twice a week is better for B’s health. Furthermore, move A3 states that exercise improves stamina, i.e. $e \uparrow \text{st}$, and that stamina improves health, i.e. $\text{st} \uparrow h$. This is used to explain why exercise improves health.

When influence is chained, e.g. $p \uparrow q$ and $q \uparrow r$, we can still infer preferences, namely that p positively influences r , i.e. $p \uparrow r$. This allows us to explain influence. For example, if someone does not understand why exercise positively influence health, we can explain that exercise positively influences stamina and that stamina positively influences health.

Definition 3 (Chained Influence). *The argument scheme that chains influence is in table 2, but because there are 4 possibilities, table 2 only shows the structure. The specific argument schemes are as follows:*

$$\frac{p \uparrow q \quad q \uparrow r}{p \uparrow r} \quad \frac{p \downarrow q \quad q \downarrow r}{p \uparrow r} \quad \frac{p \uparrow q \quad q \downarrow r}{p \downarrow r} \quad \frac{p \downarrow q \quad q \uparrow r}{p \downarrow r} \quad (2)$$

We can see influence between perspectives as a directed graph, where the edges are labeled with whether the influence is positive or negative.

When a cycle only contains edges of positive influence, e.g. health positively influences happiness and happiness positively influences health, then we can chain the cycle’s influences into a single influence, i.e. $p \uparrow p$. This is not contradictory. When a cycle contains an even amount of negative edges, then chaining will result in $p \uparrow p$.

A cycle consisting of an uneven amount of negative edges results in $p \downarrow p$ after chaining, which is inconsistent. For example, if happiness negatively influences happiness ($p \downarrow p$), then from more happiness you can conclude less happiness. When someone uses such inconsistent information, then you can attack his argument by using this inconsistency.

Table 2. Argument Scheme to Chain Influence: Chn

Premise	p has a positive/negative influence on q	$p \uparrow q$ or $p \downarrow q$
Premise	q has a positive/negative influence on r	$q \uparrow r$ or $q \downarrow r$
Conclusion	p has a positive/negative influence on r	$p \uparrow r$ or $p \downarrow r$
	Critical Question	Attack
Alternative	Does p influence other perspectives that influence r ?	E.g. $p \uparrow q_2$ and $q_2 \downarrow r$, so $p \downarrow r$

3.3 Agent’s Preferences and Values

Searle argues that typically preference orders are not given, but are the product of practical reasoning [15]. We agree and argue that values play an important role when reasoning about preferences. Before defining values, we define an agent’s preferences as follows.

Definition 4 (Agent’s Preference). *Agent α ’s preference is a perspective denoted with $<_{\alpha}$, i.e. a preorder over states. When $s <_{\alpha} t$, we say that agent α prefers state t to state s .*

When an agent does not know its preference between two states, it will reason about what is preferred. Perspectives are simply preorders on states and do not imply that one would have to find state higher in the preorder better. However, when an agent α uses a perspective as a guiding principle, i.e. α tries reach a state that is maximally preferred from that perspective, then we will call that perspective a value of α . To denote that agent α uses perspective v as a guiding principle, the predicate $\text{Values}(\alpha, v)$ is used. We now define the values that an agent holds as the perspectives that are used as guiding principles.

Definition 5 (Values). *Agent α ’s values is a set of perspectives V_{α} such that each value positively influences α ’s preference and for each value v the predicate $\text{Values}(\alpha, v)$ holds. We say that the state transition from s to t promotes value v when $s <_v t$ and demotes v when $t <_v s$. Table 3 contains an argument scheme that uses an agent’s values to reason about that agent’s preferences.*

Agents can now use their values to reason about what state is preferred. Although values are typically not defined on every pair of states, we can now use other perspectives and their influence on values to determine what is preferred.

Example 5. In our running example, there are two values: health and fun. A argues that B should act such that B’s health is improved. Consequently, health is used as a guiding principle. Similarly, B argues that exercise is no fun (or in other words, exercise negatively influences fun), and that therefore B should not exercise, making fun a guiding principle.

Table 3. Argument Scheme Value: Val

Premise	Agent α values perspective v	Values(α, v)
Premise	State t is better than state s from v	$s <_v t$
Conclusion	α prefers t to s	$s <_\alpha t$
	Critical Question	Attack
Side-effect	Does the transition demote other values?	$w \in V_\alpha$ such that $t <_w s$

3.4 Value Systems

When an agent reasons about what state is preferred, it can be the case that a state transition promotes some values and demotes other values. In this case, there is a conflict and we need a way to deal with this conflict.

Value systems can be used to resolve conflicts. Rokeach describes the notion of *value system* as follows [1]:

A value system is a learned organization of principles and rules to help one choose between alternatives, resolve conflicts, and make decisions.

Inspired by [4], we will define a value system as a preference order on sets of values. For example, someone may prefer promoting happiness to promoting health, and even prefers promoting happiness to promoting equality and health. With such a value system, we can resolve several kinds of conflicts. Since a state transition either promotes, demotes or is neutral to a value, we need to work with sets of promoted and demoted values instead of saying that the demoted is the complement of the promoted values. Before we define a value system, we first need to determine what values are promoted and demoted by a state transition.

Definition 6 (Promoted Values). *The function $pro : S \times S \rightarrow 2^V$ determines the values promoted by the transition from one state to the other. This function works as follows: $pro(s, t) = \{v \in V_\alpha | s <_v t\}$. When $pro(s, t) = V$, we say that the transition from s to t promotes values V .*

Using the pro function, we can determine the demoted values as follows.

Definition 7 (Demoted Values). *The function $dem : S \times S \rightarrow 2^V$ determines the values demoted by the transition from one state to the other. This function works as follows: $dem(s, t) = pro(t, s) = \{v \in V_\alpha | t <_v s\}$. When $dem(s, t) = V$, we say that the transition from s to t demotes values V .*

When a state transition neither promotes nor demotes a value, e.g. $v \notin (\text{dem}(s, t) \cup \text{pro}(s, t))$, we say that that state transition is neutral from that value. This approach is basically the same as the approach in [12], where the function δ maps a state transition and a value to either promote, demote or neutral.

Next, we define value systems, which can be used to resolve value conflicts, e.g. a transition promotes one value and demotes another.

Definition 8 (Value System). A value system is a preorder on sets of values. Agent α 's value system is denoted with the operator \prec_α . When $W \prec_\alpha V$, we say that agent α prefers promoting set of values V to promoting set of values W . The argument scheme associated with value systems is in table 4.

Table 4. Argument Scheme Value System: VS

Premise	the transition from s to t promotes V	$\text{pro}(s, t) = V$
Premise	the transition from s to t demotes W	$\text{dem}(s, t) = W$
Premise	α prefers V to W	$W \prec_\alpha V$
Conclusion	α prefers t to s	$s <_\alpha t$

We assume that people always prefer to promote maximal sets (regarding set inclusion), so when $V \subset W$ and $V, W \in V_\alpha$, then $V \prec_\alpha W$.

Example 6. Agent α 's values are $V_\alpha = \{v, w\}$. When α prefers promoting value w to promoting value v , α 's value system contains $\{v\} \prec_\alpha \{w\}$. The argument scheme about value systems can then be applied as follows.

$$\frac{\text{pro}(s, t) = \{v\} \quad \text{dem}(s, t) = \{w\} \quad \{v\} \prec_\alpha \{w\}}{s <_\alpha t} \text{VS} \quad (3)$$

Example 7. In move A7 of our running example, player A asks B whether B prefers health or fun. B then states that $\{\text{fun}\} \prec_\alpha \{h\}$. Consequently, B should prefer transitions that promote h and demotes fun to the transition the only promotes *fun*.

3.5 Discussion

In [9], Perelman distinguishes between abstract values, e.g. justice or truth, and concrete values, e.g. France or the Church. Concrete values are seen as being attached to living beings, specific groups, or particular objects, considered as a unique entity. Furthermore, concrete values are often used to justify abstract values and the other way around. For example, justice is important (abstract value), because you do not want people to be stealing (concrete value) and France (concrete value) is good because there is justice (abstract value). How Perelman's notions of abstract and concrete values relate to Schwartz's notions of value types and values needs further investigation. This paper uses Schwartz's notions.

Influence is now defined abstractly and ignores whether the influence is causal, a correlation, or a definition. For example, that physical health has a positive influence on health is because of the definition of *health*. On the other hand, that exercise has a positive influence on stamina is a causal relation. The difference is that one can explain causal relations, whereas one can only explain

definitions by referring to a dictionary. Consequently, one could refine the argument schemes introduced in this section by distinguishing between kinds of influence. Different critical questions can be associated with causal influence and definitional influence.

We could see an agent's preferences, its values and the perspectives that influence its values as a directed graph with as top nodes an agent's preference, the layer below that agent's values, and below the perspectives and values that influence the agent's values. This directed graph could be seen as a value hierarchy.

For example, in figure 1 boxes denote perspectives, grey boxes denote perspectives that are values, an arrow from perspective p to perspective q denotes that p positively influences q , and dotted arrows denote negative influence. Here, agent a values health, fun, and conformity. Valuing conformity means that one finds it important to comply with standards, rules, or laws. Being self-disciplined and obedient positively influence conformity. In this example however, a also values self-discipline and obedience meaning that a sees them as guiding principles, which makes those perspectives desirable ends rather than means to an end. On the other hand, *exercise* is not a value, which means that a does not think exercise is important on its own, but only because it positively influences health. In other words, if a would be asked why exercise is important, a would say because it is good for a 's health, whereas if a would be asked why health is important, a would perhaps say because it improves a quality of life.

We could have drawn an inference link between self-discipline and agent a 's preferences, but this link is implicitly there through chaining.

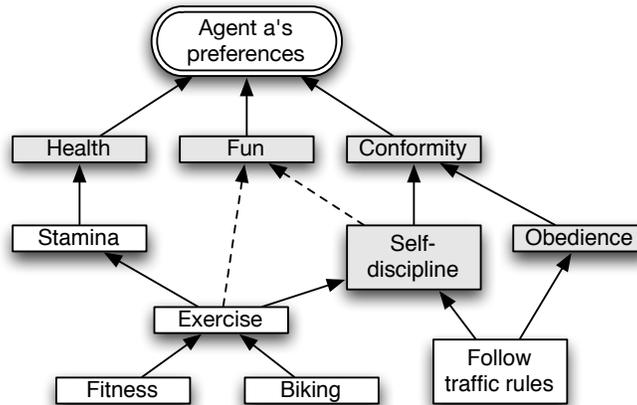


Fig. 1. Example Visualization of an Agent a 's Values

4 Practical Reasoning with Values

Many factors like values, emotions, needs, attitudes, or habit can influence behavior significantly. In certain situations, values play a significant role when reasoning about what to do. To argue about such situations, argument schemes are needed that incorporate values into practical reasoning.

In [3], Atkinson incorporates values into practical reasoning by extending Walton’s sufficient condition scheme [16] (*G is a goal for agent α , doing action A is sufficient for α to achieve G, therefore α ought to do action A*) as follows: *in the current circumstances, action A should be performed to bring about circumstances in which goal G is achieved, as this promotes value V.*

We alter Atkinson’s scheme by replacing the values and goal premise by a more general premise about that the agent prefers one state to the other. An agent’s values can be used to determine the agent’s preferences between states. In table 5 we define an argument scheme to conclude that one should take an action.

Table 5. Argument Scheme Intention: Intend

Premise	The current state is s	Holds(s)
Premise	Performing action a results in state t	Results(a, s, t)
Premise	Agent α prefers t to s	$s <_{\alpha} t$
Conclusion	α should perform a	ShouldIntend(α, a)
	Critical Question	Attack
Alternative	Can α perform another action that results in a more preferable state?	Results(b, s, t_2) and $t <_{\alpha} t_2$

Because we developed separate argument schemes in section 3 to conclude what is preferred, we can use this basic argument scheme and combine it with the other argument schemes to get the same expressive power as Atkinson’s argument scheme.

For example, one could incorporate (BDI) goals by adding a scheme like: *Agent α has goal G, G is achieved in state s, G is not achieved in state t, therefore, α prefers s to t.* Furthermore, a scheme to generate goals can be added, for example: *Current state is s, agent α prefers state t to s, therefore, α should adopt the goal to achieve t.* This scheme can be extended to allow only realistic goals, i.e. goals for which one has a (realistic) plan, by adding the premise *α has a plan to achieve t.*

5 Running Example

In this section we will use example 1 from section 1 to show how to use the argument schemes as defined previously.

Player A starts the dialogue by suggesting B to exercise twice a week, since it will improve B 's health. Implicitly, A is saying that exercising twice a week is better for B 's health than what B is doing now and A is also assuming that B values health. Consequently, A gives the following argument (where cur is the current state, e2w is the state where B exercises twice a week, e is the exercise perspective, hl is the health perspective, and a is the action that B starts exercising twice a week):

$$\frac{\text{Holds}(\text{cur}) \quad \text{Results}(a, \text{cur}, \text{e2w}) \quad \frac{\frac{\text{cur} <_e \text{e2w} \quad e \uparrow hl}{\text{cur} <_{hl} \text{e2w}} \text{Infl} \quad \text{Values}(B, hl)}{\text{cur} <_B \text{e2w}} \text{Val}}{\text{ShouldIntend}(B, a)} \text{Intend} \quad (4)$$

Next, B asks A for explanation for why exercise is good for B 's health. In other words, B asks why the premise $e \uparrow hl$ is true. A answers B 's question by claiming:

$$\frac{e \uparrow st \quad s \uparrow hl}{e \uparrow hl} \text{Chn} \quad (5)$$

Now B understand and claims that he can also bike to work, called action b , which will also improve health:

$$\frac{\text{Holds}(\text{cur}) \quad \text{Results}(b, \text{cur}, \text{bike}) \quad \frac{\frac{\text{cur} <_e \text{bike} \quad e \uparrow hl}{\text{cur} <_{hl} \text{bike}} \text{Infl} \quad \text{Values}(B, hl)}{\text{cur} <_B \text{bike}} \text{Val}}{\text{ShouldIntend}(B, b)} \text{Intend} \quad (6)$$

However, A does not agree since biking to work is less healthy than exercising twice a week. A attacks B 's use of the *Intend* argument scheme by giving an alternative action that is better:

$$\frac{\text{Results}(b, \text{cur}, \text{e2w}) \quad \frac{\text{bike} <_{hl} \text{e2w} \quad \text{Values}(B, hl)}{\text{bike} <_B \text{e2w}} \text{Val}}{\neg \text{Intend}} \text{Alternative} \quad (7)$$

B does not respond to this claim and rebuts one of the premises of A 's original claim by claiming that exercising is boring:

$$\frac{\text{e2w} <_{fun} \text{cur} \quad \text{Values}(B, fun)}{\text{e2w} <_B \text{cur}} \text{Val} \quad (8)$$

We now have two arguments that rebut each other. Depending on B 's value priorities, one argument will win. A responds by asking B whether he finds fun or health more important. B responds that health is more important than fun.

$$\frac{\text{pro}(\text{cur}, \text{e2w}) = \{hl\} \quad \text{dem}(\text{cur}, \text{e2w}) = \{fun\} \quad \{fun\} \prec_B \{hl\}}{\text{cur} <_B \text{e2w}} \text{VS} \quad (9)$$

In the latter part of the dialogue, an argument is built to conclude that B should prefer exercising based on B 's values. This argument takes into account B 's value system and arguments concerning promotion and demotion of the values health and fun. However, this does not mean that B has to agree that he should exercise twice a week rather than biking to work, since it depends on how B accrues the arguments pro and con.

6 Conclusions

In this paper, we have introduced several argument schemes to reason about whether values are promoted and for practical reasoning. First, we have clarified the notion of values using social psychology literature. Next, we argued that since values are typically abstract, we need to reason about what state is preferred from the perspective of a value. To accomplish this, we have introduced the notions of perspective and influence. Perspectives are defined as preorders on states. Values are then defined as perspectives that people use as guiding principles. When it is not known what state is better from the perspective of a value, information about the influence between value perspectives and other perspectives is used to argue what state is better. Value systems are introduced to help resolve conflicts between values during the pursuit of values. Finally, we show how we can now do practical reasoning using this approach.

Our contribution in this paper allows arguments about what values mean, which is important according to Perelman [9]. Furthermore, our approach allows value preference orders to be incompletely specified, since we can reason about whether a state is better from the perspective of a value. This enables reasoning about preference orders, which is considered important by Searle [15].

6.1 Future Work

Our first step will be to fully formalize these argument schemes and to build an argumentation framework that allows accruing influence. Interesting extensions are to incorporate certainty of arguments, a distance measure between states from a perspective, e.g. s is much healthier than t , and the size of influence, e.g. exercising a bit more increases health significantly. Rather than having to completely specify a value system, we also think that using our perspective approach allows reasoning about value systems.

In [2], ten motivationally distinct value types are derived in order to be comprehensive of the core values recognized in cultures around the world. For each value type, several examples of values are given. We could formalize these ten value types by seeing them as values and we could start by using the example values as perspectives that positively influence the value types. Since these value types are shown to hold universally, having a model of these value types and the most common values, would give argumentation systems a useful general model to argue about values.

Furthermore, the Schwartz Values Theory explicates dynamic conflict and harmony relations between values. For example, pursuing the value of being successful typically conflicts with the value of enhancing the welfare of others and pursuing the value of novelty and change typically conflicts with values of tradition. In contrast, pursuing tradition values is congruent with pursuit of conformity values. Such relations between values could be represented as either positive or negative influence. However, in order to use this negative influence in argumentation, we need to explain why it is a negative influence. This may be case-dependent and thus requires a more thorough model.

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