

Supplementary Materials

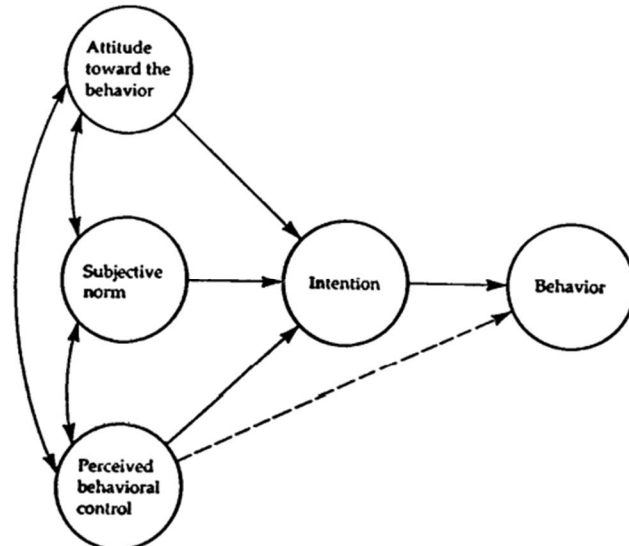
Author information, detailed references, short introduction to the theory and graphical representations of the theory are presented when appropriate.

Theory of Planned Behaviour

Ajzen, I. (1991). The Theory of Planned Behaviour. *Organisational Behaviour and Human Decision Processes*, 50, 179-211.

“The Theory of Planned Behaviour proposes that volitional human behaviour is a function of the intention to perform the behaviour and perceived behavioural control (PBC). Intention is hypothesised to be a function of attitudes towards the behaviour, subjective norm and perceived behavioural control. The degree to which PBC influences behaviour directly (rather than indirectly through intention) is hypothesised to depend on the degree of actual control over the behaviour. Attitudes, subjective norms and PBC are assumed to be based on the strength and evaluation of accessible behavioural, normative and control beliefs.”

Extracted from: Sniehotta, F. F., Pesseau, J., & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health Psychology Review*, 8(1), 1-7.
doi:10.1080/17437199.2013.869710



Norm Activation Model/Theory (Subset of the Normative Decision-Making Model)

Schwartz, S. H. (1977). Normative influences on altruism. *Advances in Experimental Social Psychology*, 10, 221-279.

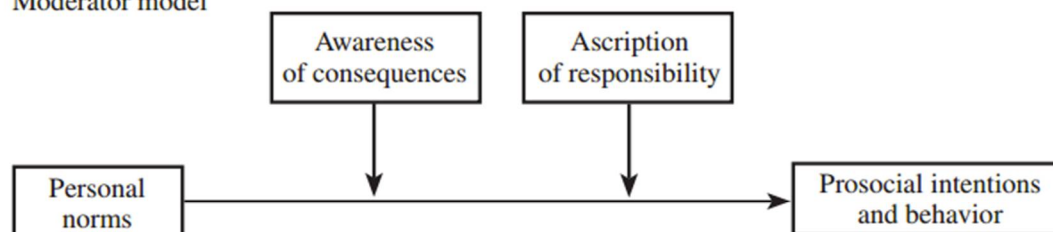
Schwartz, S. H., & Howard, J. A. (1980). Explanation of the moderating effect of responsibility denial on a personal norm-behaviour relationship. *Social Psychology Quarterly*, 43, 441-446.

“The NAM includes three types of variables to predict prosocial behavior. The first of these is personal norms (PN), referred to as feeling a “moral obligation to perform or refrain from specific actions” (Schwartz & Howard, 1981, p. 191). The second, awareness of consequences (AC), is defined as whether someone is aware of the negative consequences for others or for other things one values when not acting prosocially. The third, ascription of responsibility (AR), is described as feelings of responsibility for the negative consequences of not acting prosocially.

In essence, two interpretations of the NAM have been postulated. Some scholars suggest that AC is an antecedent of AR, AR is an antecedent of PN, and PN influences behavior, whereas others assume that the influence of PN on prosocial behavior is moderated by AC and AR (see figure below). Researchers proposing a mediator model assume that AC and AR have indirect effects on intentions and behavior via PN. More specifically, PN is assumed to mediate the relationship between AR and prosocial intentions and behaviors, and AR is assumed to mediate the relationship between AC and PN.”

Extracted from: Judith I. M. De Groot & Linda Steg (2009) Morality and Prosocial Behavior: The Role of Awareness, Responsibility, and Norms in the Norm Activation Model. *The Journal of Social Psychology*, 149(4), 425-449, doi: 10.3200/SOCP.149.4.425-449

Moderator model



Mediator model

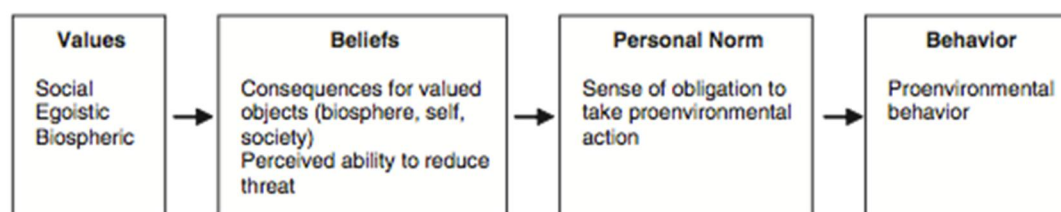


Value-Belief-Norm theory

Stern., P. C., Dietz., T., Abel., T., Guagnano., G. A., & Kalof., L. (1999). A Value-Belief-Norm Theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6, 81-97.

“The Value-Belief-Norm theory links a person’s ecological worldview, assessed by the new environmental paradigm (NEP), and environmental values with the norm-activation theory. It postulate moral norms (called personal norms) – a person’s sense of obligation – to be the ultimate predictor of conservation behaviour. Personal norms, in turn, are seen as a function of a chain of 3 beliefs: one’s self-ascribed responsibility, one’s awareness of the consequences of a behaviour for the valued object, and one’s ecological worldview (i.e., the NEP), which in turn is determined by environment-relevant values. In this model, a person’s awareness of the behavioural consequence depends on his or her ecological worldview and, at the same time, determines a person’s self-ascribed responsibility to act, which then leads to a person’s sense of obligation to act (i.e., his or her personal norms).”

Extracted from: Kaiser, F. G., Hübner, G. & Bogner, F. X. (2005). Contrasting the Theory of Planned Behaviour With the Value-Belief-Norm Model in Explaining Conservation Behaviour. *Journal of Applied Social Psychology*, 35, 2150–2170. doi: 10.1111/j.1559-1816.2005.tb02213.x



Theory of Interpersonal Behaviour

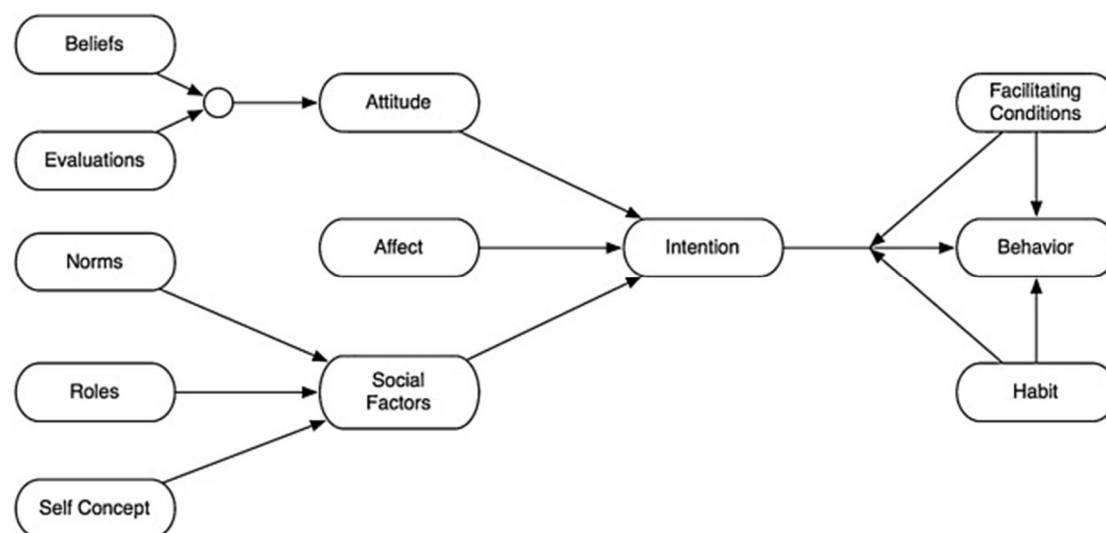
Triandis, H. C. (1977). *Interpersonal Behaviour*. Monterey, CA: Brookes/Cole.

“In the Theory of Interpersonal Behaviour, intention is formed by attitudinal, normative, and identity beliefs. Affect represents an emotional state that the performance of a given behaviour evokes for an individual. It is considered as the affective perceived consequences of the behaviour, whereas perceived consequences refer to the cognitive evaluation of the probable consequences of the behaviour. The TIB incorporates two different normative dimensions: social and personal norms. Perceived social norms are formed by normative and role beliefs. Normative beliefs consist of the internalisation by an individual of referent people or groups' opinion about the realisation of the behaviour, whereas role

beliefs reflect the extent to which an individual thinks someone of his or her age, gender and social position should or should not behave. The other normative component of the TIB is the personal normative belief that represents the feeling of personal obligation regarding the performance or not of a given behaviour. Finally, self identity refers to the degree of congruence between the individual's perception of himself or herself and the characteristics he or she associates with the realisation of the behaviour.”

Extracted from: Gagnon, M. P., Godin, G., Gagné, C., Fortin, J. P., Lamothe, L., Reinharz, D., & Cloutier, A. (2003). An adaptation of the theory of interpersonal behaviour to the study of telemedicine adoption by physicians. *International Journal of Medical Informatics*, 71(2–3), 103-115. doi: 10.1016/S1386-5056(03)00094-7

In addition, habit and contextual aspects are also hypothesised to interact with intention to produce a final behaviour.



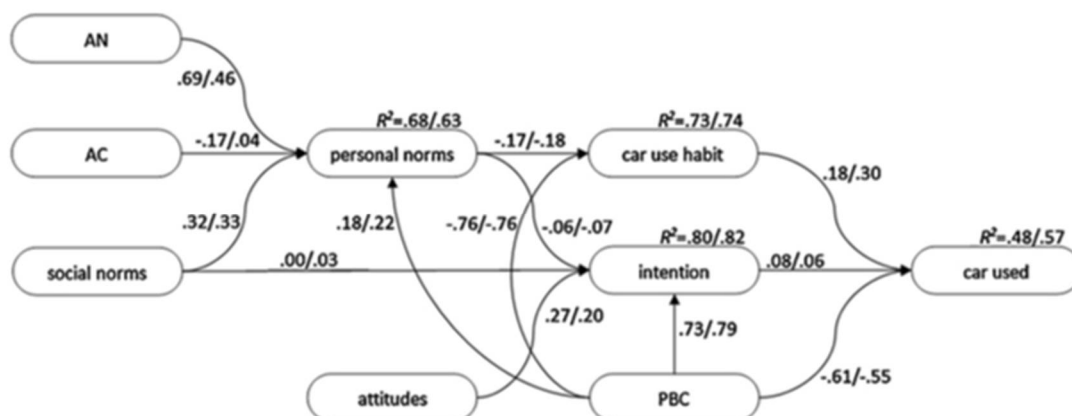
Comprehensive Action Determination Model

Klöckner, C. A., & Blöbaum, A. (2010). A comprehensive action determination model: Toward a broader understanding of ecological behaviour using the example of travel mode choice. *Journal of Environmental Psychology*, 30, 574-586.

Klöckner, C. A., & Friedrichsmeier, T. (2011). A multi-level approach to travel mode choice – How person characteristics and situation specific aspects determine car use in a student sample. *Transportation Research Part F: Traffic Psychology and Behaviour*, 14, 261-277.

“The model assumes that individual environmentally relevant behaviour is determined directly by intentions and perceived behavioural control. In addition it integrates habit strength as a third direct predictor of behaviour. Habit strength is also assumed to moderate the relation between intention and behaviour, meaning that the intention behaviour link is weakened if habits are strong. Intentions typically integrate the influence of attitudes, social norms and perceived behavioural control, but furthermore include the impacts of personal norms. Personal norms are assumed to be predicted by awareness of consequences and ascription of responsibility, perceived behavioural control, and social norms. Attitudes in contrast are included as specific evaluations of the respective behaviour. Although habit strength is theoretically not related to the other model variables, correlations with the central determinants of behaviour might still appear, given that the deliberate determinants of behaviour are stable over time. Habits are generated by repeated action in stable contexts. At an earlier point in time, when a behaviour was performed for the first couple of times, intentions and PBC were the main determinants. By repeating it, a habit was established and it took over control from the two variables. However, if intentions, behavioural control and personal norms did not change, they would remain correlated to habit strength because they determined behaviour at a previous point in time.”

Extracted from: Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behavior – A meta-analysis. *Global Environmental Change*, 23(5), 1028-1038. doi: 10.1016/j.gloenvcha.2013.05.014

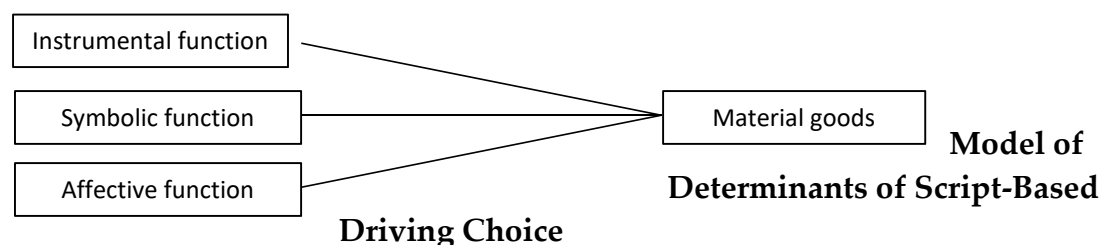


Model of Material Possessions

Dittmar, H. (1992). *The Social Psychology of Material Possessions: To Have is To Be*. Harvester Wheatsheaf, Hemel Hempstead, UK.

“According to Dittmar, material possessions, such as cars, represent instrumental values as well as by symbolic values. The symbolic values refer to the identity of a person. They are twofold: the expression of the self and a social–categorical expression indicating one’s social position or group membership. Moreover, Dittmar contends that the use of material goods fulfils three functions: instrumental, symbolic, and affective. This implies that car use may have an instrumental function (i.e., it enables activities), a symbolic function (i.e., the car is a means to express yourself or your social position), and an affective function in connection with deeper, non-instrumental needs and desires. These functions may be considered as different types of motives for car use. So, three categories of car use motives may be distinguished. Instrumental motives may be defined as the convenience or inconvenience caused by car use, which is related to, among other things, its speed, flexibility and safety. Symbolic or social motives refer to the fact that people can express themselves and their social position by means of (the use of) their car, they can compare their (use of the) car with others and to social norms. Affective motives refer to emotions evoked by driving a car, i.e., driving may potentially affect people’s mood and they may anticipate these feelings when making travel choices.”

Extracted from: Steg, L. (2005). Car use: Lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice*, 39(2–3), 147-162. doi:10.1016/j.tra.2004.07.001

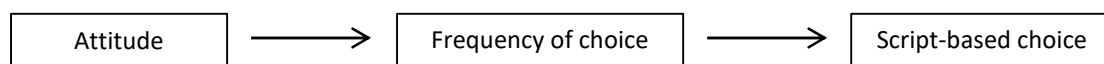


Gärling, T., Fujii, S., & Boe, O. (2001). Empirical tests of a model of determinants of script-based driving choice. *Transportation Research Part F: Traffic Psychology and Behaviour*, 4, 89-102.

“Although a choice between alternatives the first time requires deliberation, repeatedly making the same choice is likely to reduce information processing preceding the choice. We suggest that less deliberate decision making implies using simplifying decision strategies which utilizes observed regularities. If a choice alternative is conceptualized as a set of attribute levels, a salient regularity is that attribute levels covary. If so, it is no longer necessary to search all attribute information since the same choice can be made on the basis of a subset of the information. We term this *script-based* choice, since it is presupposed that the information about the choice alternatives is stored in memory as a script that can be

retrieved if only a subset of the information is available. Script-based choice is cognitively economical in that demand for deliberate information processing is reduced. Furthermore, it may also be goal-directed or rational. As illustrated in the figure below, a positive attitude towards or positive evaluation of a choice alternative is assumed to lead to that it is chosen. If nothing changes, the choice will be made over and over again. Eventually information accessible in memory makes possible to infer regularities between the attributes of the choice alternatives."

Extracted from: Gärling, T., Fujii, S., & Boe, O. (2001). Empirical tests of a model of determinants of script-based driving choice. *Transportation Research Part F: Traffic Psychology and Behaviour*, 4(2), 89-102. doi:10.1016/S1369-8478(01)00016-X



Model of Action Phases

Heckhausen, H., & Gollwitzer, P. M. (1987). Thought contents and cognitive functioning in motivational versus volitional states of mind. *Motivation and Emotion*, 11, 101–120.

Gollwitzer, P. M. (1996). *The volitional benefits of planning*. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour* (pp. 287–312). London: Guilford.

"The "Rubicon model" of action phases goes beyond the useful conceptual distinction between goal setting and goal striving. Although the model keeps these two problems of goal-oriented behaviour separate, it encompasses both within a single theoretical model, thus permitting them to be analysed in relation to each other. Furthermore, it provides a temporal perspective that begins with the awakening of a person's wishes prior to goal setting and continues through the evaluative thoughts entertained after goal striving has ended.

Separating the sequence of events occurring within this comprehensive time frame into discrete phenomena, the model posits four distinct phases: first, the predecisional phase; second, the postdecisional but still preactional phase; third, the actional phase; and last, the postactional phase. These phases are separated by three clear boundaries or transition points: the making of a decision, the initiation of respective actions, and the conclusion of these actions."

Extracted from: Gollwitzer, P. M. 1990. Action phases and mind-sets. In *Handbook of Motivation and Social Cognition: Foundations of social behaviour*, Vol. 2, E. T. Higgins & R. M. Sorrentino (Eds). Guilford: New York; 53-92.

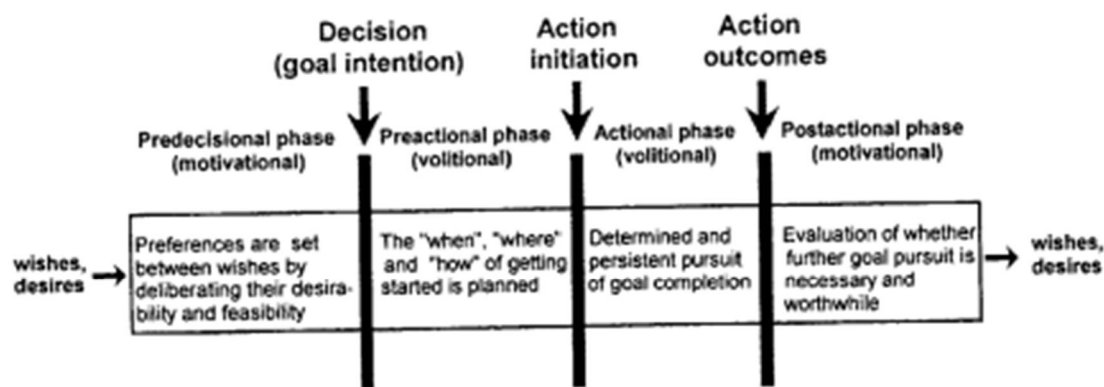


FIGURE 13.1. The model of action phases dissects the course of wish fulfillment into two motivational and two volitional phases. The boxes between the transition points (decision, action initiation, and action outcomes) describe the distinct tasks associated with each of the four phases (predecisional, preactional, actional, and postactional).

Stage Model of Self-Regulated Behavioural Change

Bamberg, S. (2013). Changing environmentally harmful behaviors: A stage model of self-regulated behavioural change. *Journal of Environmental Psychology*, 34, 151-159.

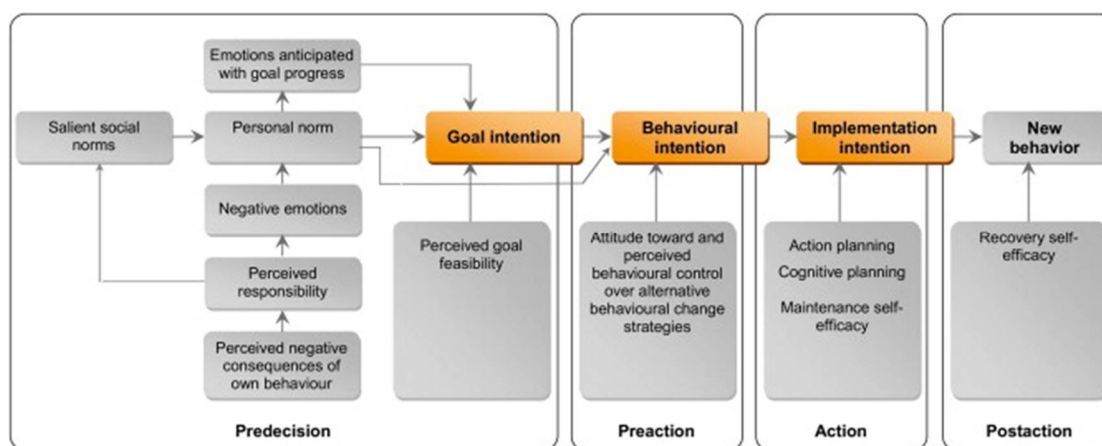
"In its current form, Bamberg's stage model contains the following stages: (1) pre-decisional, (2) pre-actional, (3) actional, and (4) post-actional. Forming a goal intention to change marks the transition from pre-decision to pre-action, forming a behavioral intention marks the transition from pre-action to action, and the implementation intention marks the transition into post-action. In other words, people in different stages focus on different aspects: Firstly, it has to be discovered that something has to be done, then what should be done, then how it will be done and then how it can be maintained.

In each stage each specific intention type is expected to be influenced by characteristic variables. In line with the norm-activation theory goal intentions are assumed to be formed based on personal norms (which are feelings of moral obligation to act), anticipated positive emotions with the behaviour and goal feasibility. The personal norm is activated through a process as described in the value-belief-norm theory: Perceived negative consequences of a behaviour trigger a feeling of responsibility which lead to anticipated negative emotions in case of non-action. This anticipated negative emotion then activates personal norms. Furthermore, social norms (which are perceived expectations of relevant other people) are assumed to trigger personal norms.

In the pre-actional stage, when a choice between alternative behaviours is made, the behavioural intention is assumed to be impacted by attitudes to the different alternatives as well as the perceived difficulty of the alternatives. This is in line with the Theory of Planned Behaviour. However, contrary to the Theory of Planned Behaviour, social norms are not intended to be relevant in this stage of decision making, their impact lies in the previous stage as described in the preceding paragraph.

In the actional stage, different types of planning abilities are assumed to impact implementation intentions. Bamberg makes a references for this stage to Schwarzer, who assumed that planning abilities include both being able to anticipate what to do when something goes wrong – having a plan b (coping planning) – and being able to plan the action in detail (action planning). Finally, in the post-actional stage, the perceived ability to recover from relapse (recovery self-efficacy) should increase probability to maintain a behaviour.”

Extracted from: Klöckner, C. A. (2014). The dynamics of purchasing an electric vehicle – A prospective longitudinal study of the decision-making process. *Transportation Research Part F: Traffic Psychology and Behaviour*, 24, 103-116. doi: 10.1016/j.trf.2014.04.015



Normative Decision-Making Model

Schwartz, S. H., & Howard, J. A. (1981). A normative decision-making model of altruism. In Rushton, J. P. (Ed.), *Altruism and helping behaviour. Social, personality and developmental perspective*. Hillsdale, NJ: Earlbaum.

“Schwartz’ Model of Normative Decision-Making (NDM) deals with behaviour that is referring to social and personal norms and is therefore triggering the individual's normative system. Schwartz and Howard conceptualize behaviour in these contexts

as being caused by feelings of moral obligation to act in a norm concordant way. This feeling of moral obligation in turn is caused by activated *Personal Norms* (PN), which are—from a biographical point of view—internalized and therefore adapted *Social Norms* (SN) that might themselves be understood as perceived expectations of relevant others.”

Extracted from: Klöckner, C. A., & Matthies, E. (2004). How habits interfere with norm-directed behaviour: A normative decision-making model for travel mode choice. *Journal of Environmental Psychology*, 24(3), 319-327. doi: 10.1016/j.jenvp.2004.08.004

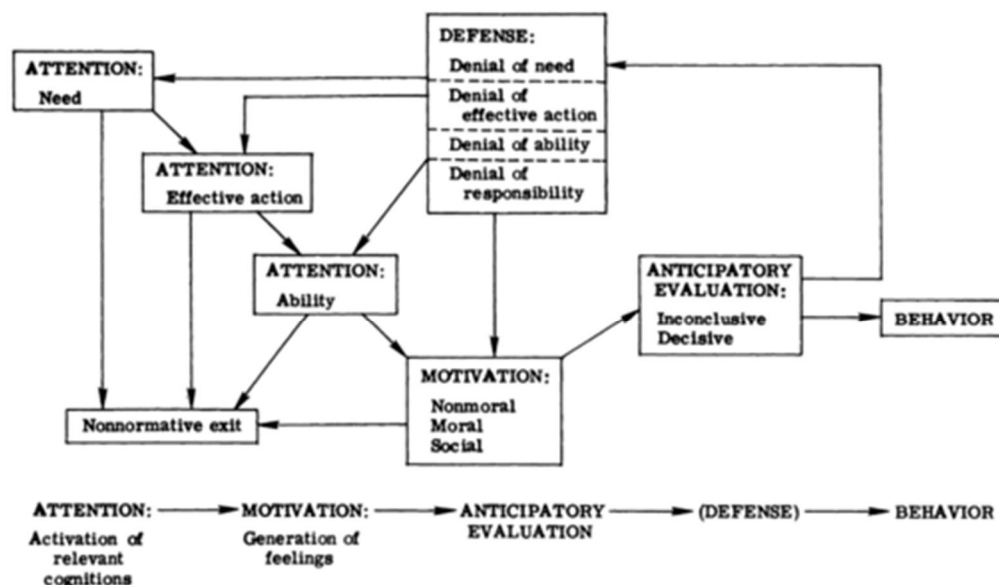


Figure 14.1 Cycling through a normative decision-making model. (Adapted from Schwartz & Howard, 1981. Reprinted by permission of Lawrence Erlbaum Associates.)

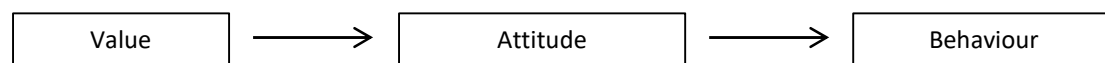
Value Attitude Behaviour Hierarchy Model

Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value–attitude–behaviour hierarchy. *Journal of Personality and Social Psychology*, 54, 638–646.

“In terms of social adaptation theory, values are a type of social cognition that function to facilitate adaptation to one’s environment. Values are similar to attitudes in that both are adaptation abstractions that emerge continuously from the assimilation, accommodation, organisation and integration of environmental information in order to promote interchanges with the environmental favourable to the preservation of optimal functioning. Because values are the most abstract of the social cognitions, they reflect the most basic characteristics of adaptation. These abstractions serve as prototypes from which attitudes and behaviours are

manufactured. Cognitions and therefore values, also guide individuals about which situations to enter and about what they do in those situations. Within a given situation, the influence should theoretically flow from abstract values to midrange attitudes to specific behaviours. This sequence can be called the value → attitude → behaviour hierarchy.”

Extracted from: Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value–attitude–behaviour hierarchy. *Journal of Personality and Social Psychology*, 54, 638–646.



Prospect Theory

Kahneman, D., & Tversky, A.. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291.

“The theory is developed for simple prospects with monetary outcomes and state probabilities, but it can be extended to more involved choices. Prospect theory distinguishes two phases in the choice process: an early phase of editing and a subsequent phase of evaluation. The editing phase consists of a preliminary analysis of the offered prospects, which often yields a simpler representation of these prospects. In the second phase, the edited prospects are evaluated and the prospect of highest value is chosen.”

Extracted from: Kahneman, D., & Tversky, A.. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291.

Selection, Optimism and Compensation Model

Baltes, P. B., & Baltes, M. M. (1990) Psychological perspectives on successful aging: The model of selective optimisation with compensation. In P. B. Baltes & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioural sciences* (pp.1-34). New York: Cambridge University Press

“The Selection, Optimism and Compensation model provides a way to conceptualize the approaches that older adults take to cope with losses such as the ability to drive. In this model, selection refers to the restriction of activities associated with age-related declines. The task of the person is to select those activities that are the most important and to focus more of their available resources to these undertakings. Optimization refers to the refinement of skills so that abilities will correspond with goals. Compensation refers to the use of new methods for

reaching one's desired goals and can include new behaviours or modification of existing behaviours. This life span developmental approach argues that as older adults are confronted by losses, they should still be able to age successfully as they modify their coping behaviours. The implications of this model as applied to driving retirement are that as people face the losses of health, functional capacity, and cognitive abilities commonly associated with reduction in driving, they will compensate by modifying their driving habits and, eventually, find ways to substitute other means of transportation."

Extracted from: Pickard, J. G., Tan, J., Morrow-Howell, N., & Jung, Y. (2009). Older drivers retiring from the road: An application of the selection, optimization, and compensation model. *Journal of Human Behavior in the Social Environment*, 19(2), 213-229. doi:10.1080/10911350802687232

Theory of Cognitive Dissonance

Festinger, L. (1957). *A Theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

"Cognitive dissonance is defined as inconsistency between attitudes or between attitudes and behaviour. Cognitive dissonance, or a threat of it, creates an unpleasant psychological tension. If a person believes that preservation of the environment is desirable but is still driving a car, the person is engaged in attitude-discrepant behaviour. Cognitive dissonance is experienced especially if the inconsistency is stressed, e.g. by mass-media campaigns. The dissonance, being psychologically uncomfortable, will motivate the person to try to reduce it by either decreasing car use (behavioural change) or by making attitudes to the undesirable effects of car use less negative (attitude change)."

Extracted from: Tertoolen, G., van Kreveld, D., & Verstraten, B. (1998). Psychological resistance against attempts to reduce private car use. *Transportation Research Part A: Policy and Practice*, 32(3), 171-181. doi:10.1016/S0965-8564(97)00006-2

Theory of Cognitive Evaluation

Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.

"The theory suggests that the presence of a salient external reward or constraint can induce a change in the perceived locus of causality from internal to external, resulting in decreased intrinsic motivation, whereas the absence of a salient or constraint and the presence of choice can induce a change in the perceived locus of causality from external to internal resulting in increased intrinsic motivation. The

theory also points to a second process through which intrinsic motivation can be affected: a change in perceived competence. If an environmental even enhances people's perceptions of competence, their intrinsic motivation will increase; if it diminishes their perceptions of competence, their intrinsic motivation will decrease. This means that an environmental even can decrease intrinsic motivation by making the perceived locus of causality more external or by deflating one's perceptions of competence and, conversely, an even can increase intrinsic motivation by making the perceived locus of causality more internal or by bolstering one's perceptions of competence."

Extracted from: Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43(3), 450-461. doi: 10.1037/0022-3514.43.3.450