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Shaping environmental policy in a citizen-friendly manner

How behavioural science findings can make environmental-policy instruments more effective

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1 Innovative environmental policy through behaviour-oriented instruments

1.1 Motivating people to make decisions for environmentally-friendly actions

Our environmental-policy goals can only be achieved if the instruments used to achieve them are sufficiently effective and all parties involved are motivated to work towards achieving them. However, existing environmental-policy instruments such as information requirements, subsidies and taxes are only partially effective. Regulatory interventions directly control behaviour; however, they do not necessarily reduce environmental risks where they impose the lowest possible alternative costs on society. The design of environmental-policy instruments does not often adequately address people in our society as the cause of negative environmental effects. This is why they do not choose to carry out environmentally-friendly actions on the scale for which the instruments were actually designed. This is not a problem of environmental policy alone, it can be observed in all policy areas.

What can therefore be done to motivate people in their private lives or in their roles as employees or employers to make decisions for environmentally-friendly action? How can existing instruments be improved accordingly – and is it possible to develop new instruments?

It is becoming increasingly clear that if environmental-policy instruments are to become successful, we must address the fundamentals and the individual factors that influence human decision-making. Insights from the fields of psychology, cognitive science and behavioural economics in particular can make a significant contribution here. For this reason, political institutions around the globe are becoming increasingly involved with the development, testing and implementation of new concepts for the design of instruments based on these behavioural-scientific findings.

At present, however, there is still a lack of reliable information on which configurations of instruments will lead to success in which cases. In addition, the knowledge about the fundamentals of behavioural science and the effects of instruments has still not been sufficiently recorded and developed in a systematic way. In this respect, we do not yet know enough about how to develop behaviour-oriented instruments and the factors that we need to consider.

This policy paper provides concrete support for relevant actions in this regard. It focuses on human decision-making processes and their influencing factors, combined with a behavioural-scientific concept of new environmental-policy instruments and a classification of existing ones. It shows how important it is to use a set of different instruments and what the priorities are. Building on this, the policy paper provides a guide for the development of behaviour-oriented instruments. This guide contains a practice-oriented checklist that is useful for the development of behaviour-oriented, environmental-policy instruments.

The policy paper thus supplements current publications on the subject published by the EU [1], the OECD [2] and the World Bank [3]. The approaches developed in the policy paper and the checklist are not only relevant for the environmental policy, they are also important for other policy fields such as the health policy.

In summary, the policy paper focuses on the following points:

- Overview of the phases of decision-making processes and influencing factors,
- An overview of behaviour-oriented, environmental-policy instruments, which includes traditional instruments and addresses the phases and influencing factors of decision-making processes,
- Documentation of a practice-oriented guide for the design of behaviour-oriented, environmental-policy instruments.

The policy paper is associated with the two research projects INCENT I and INCENT II[1], which were initiated by the UBA in 2012 and 2013 respectively. The goal of the projects was to identify innovative approaches for improving the incentive effect of environmental-policy instruments, to systematically evaluate these and use them as a basis for identifying points of contact for the further development of environmental-policy instruments. The research projects were based (inter alia) on literature analyses, conceptual considerations and on the results of a survey, a laboratory experiment and a field experiment.

The topic itself means that this policy paper of course naturally contains technical terms in the field of behavioural science. It is not always possible to explain these terms in context; they are therefore written in italics in the text and a more detailed explanation can be found in the **glossary in Annex I**. The glossary also explains all behavioural science terms used in the illustrations.

1.2 A change of perspective is necessary

A behavioural-scientific orientation of environmental-policy instrumentation requires a change of perspective: Political measures, whether aimed at consumers or companies, are often based on an image, which in an economic sense, depicts the completely rational, hyper-intelligent and profit-maximising Homo economicus. If people matched this image, it would probably be enough to provide the addressees of environmental policy with all the relevant information – including information on possible financial burdens from taxes, duties and possible penalties. The addressees could easily pick up all the information, fully understand it and process it in such a way that they could make a rational decision for action. But does this really reflect reality? Practical policy experiences indicate otherwise. People do not act like Homo economicus. People make mistakes. They recognise regularities where there are no rules, make decisions based on emotions and irrelevant information, and leave decisions to others, either because it is more convenient or because they consciously orient themselves towards their peer group. Human decision-making is influenced by many influencing factors. Investigating this and examining interdependencies for the design of environmental-policy instruments requires an interdisciplinary approach, as pursued by this policy paper.

1 INCENT I (completed in December 2014): Inventory of innovative explanatory approaches – innovative approaches to improving the incentive effect of environmental-policy instruments – Sub-project I [4]; INCENT II (completed in November 2016): Further development of environmental-economic instruments – innovative approaches to improving the incentive effect of environmental-policy instruments – Sub-project II [5].

1.3 The interdisciplinary approach as a starting point

The change of perspective requires a basic knowledge about human decision-making processes. On the one hand, these can be found in psychology, cognitive science and (more recently) neuroscience, and in behavioural economics on the other.

In this context, cognitive science in particular has dealt extensively with the mental processes involved in decision-making. It sees decision-making as a process that can be simpler or more complex, depending on the decision-making problem. The decision-making process is simple when it is 'only' a matter of making a judgment and then making a decision. It is complex, if goals and possible actions are not or only rudimentary known; then more elaborate cognitive processes, so-called *problem-solving processes* are associated with the decision.

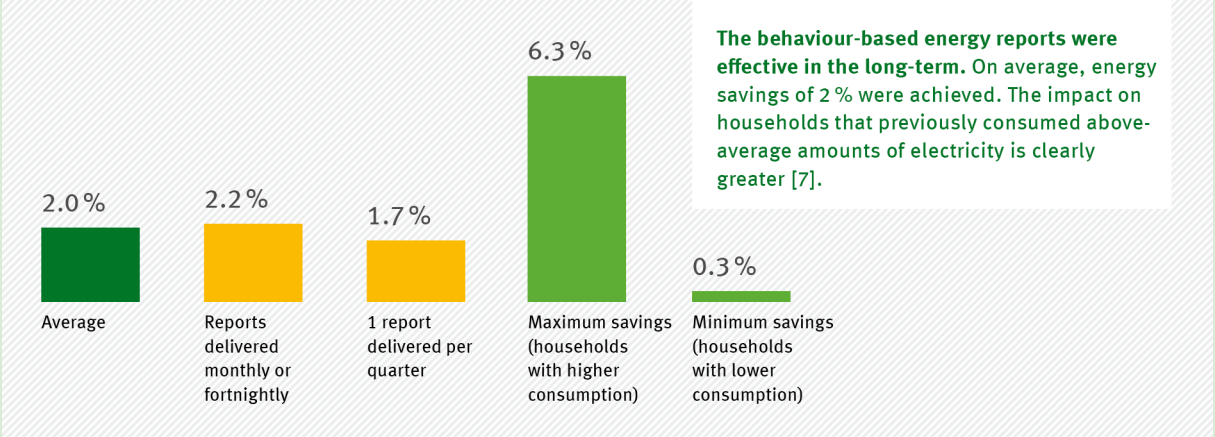
More recent behavioural economics, on the other hand, has a much narrower focus: It basically refers to the model of Homo economicus and examines the areas in which the decisions of people systematically deviate from the optimal decision. This only relates to the decision itself, not to the whole decision-making process.

However, the perspective of behavioural economics was not always so closely focused. Nobel laureate Herbert Simon could be described as an old-school behavioural economist [6]. He was an economist, a cognitive scientist and a psychologist – and he developed an explicit alternative to Homo economicus with his concept of *restricted* or *procedural rationality*. The decision-making model developed for this policy paper is based on the research of Herbert Simon and merges this with current findings on the decision-making process in psychology, cognitive science and behavioural economics.

Does the regular sending of behaviour-based energy reports lead to energy savings?
A field experiment in the USA divided **600,000 households** into **3 experimental groups** and **1 control group**. Over a period of 23 months, the groups received energy reports, which were well-prepared in terms of graphics. These provided information on their own energy consumption in relation to the consumption of comparable neighbouring households. The consumption of households with the three classes was rated great, good and below average and in the first two cases rewarded with smileys. In addition, there were individually adapted, simple energy-saving tips and an estimate of the associated cost reduction. The three groups differed according to whether the reports were sent every two weeks, monthly or only once a quarter. The control group received no energy reports.

Figure 1:

Savings compared to previous consumption



Source: Allcott, H. 2011 Social norms and energy consumption. Journal of Public Economics 95 (9-10):1082-95.

1.4 A simple example of the effectiveness of behaviour-oriented instruments

A simple example of the behaviour-oriented conception of new instruments and an improvement in existing instruments is the design of the energy bill. Its contents are relatively comprehensively regulated in the European Union. As a result, the bill currently contains a multiplicity of confusingly-represented numbers and facts, which are supposed to inform the energy-consumers comprehensively and transparently, and motivate them to save energy. Important information and behaviour-oriented instruments are lost in the sheer mass of material, e.g. the comparison of personal consumption with the consumption of reference groups – and this is information which is prescribed as an item on the bill.

A behaviour-oriented energy bill must have a different appearance. The bill and the accompanying energy reports must be clearly presented on the basis of behavioural-scientific findings – and they must also be formulated in such a way that the recipients can clearly trace their energy consumption and also understand the behaviour-based instruments on the bill. An energy bill should also contain specific and graphically-appealing energy-saving tips. In this way, energy consumers will be encouraged and empowered to perceive, consider and implement the politically-desirable goal of saving energy. Utopia? A measure like this can lead to average energy savings of 2 %, a value determined in an American study (**‣see Fig. 1**). Another behavioural measure in Europe led to significantly higher averages, but was also much more expensive: Savings of up to 65 % were realised in an EU project, in which households in neighbourhood districts not only received behaviour-oriented information about energy consumption – a competition between these neighbourhood districts and their municipalities was also initiated [8].

1.5 Delimitation to nudging and libertarian paternalism

In the public discussion, behavioural instrumentation is more often associated with nudging. This term was coined by Thaler and Sunstein [9] and embodies the idea that simple, behaviour-oriented measures can be used to motivate people to behave in a politically-desirable way; just a small ‘nudge’ should suffice. Thaler and Sunstein also associate this with a political concept, ‘libertarian paternalism’, which is essentially aimed at avoiding regulatory instruments. The approach taken by Thaler and Sunstein met with a great response and was the basis of the many initiatives for behavioural regulation. However, it has also been criticised on many occasions. This cannot be discussed in detail in this paper, but one thing must be emphasised: This policy paper is not based on the concept of libertarian paternalism (**‣see also [1]**). Behaviour-oriented instruments should also not be designed in such a way that people are ‘nudged’ to unconsciously carry out politically desirable actions.

Rather, this paper tackles the issue of how people’s competences and their decision-making power can be strengthened and how they can be motivated to participate consciously. It becomes clear here that such behaviour-oriented instrumentation is more complex and difficult than is often suggested in the discussion about nudging.

2 Basic findings from behavioural research

2.1 In focus: Decisions for environmentally-friendly management

Whether in the private sector or at the workplace, people perform a variety of actions every day. Some of these actions happen unconsciously (e.g. the blink of an eye), some have become so routine (routine procedures) that it is no longer necessary to think about them (e.g. switching on lights, driving a car and some production processes in companies). In turn, people think briefly about a number of actions before acting and then decide relatively swiftly which action – from an already-known set of actions – is to be carried out (election actions, e.g. leisure planning or decisions in connection with procurement in companies). Other actions, on the other hand, especially those that have never before been carried out by humans, require significantly more cognitive effort and more comprehensive decision-making or problem-solving processes (innovation actions; e.g. the ecological rehabilitation of a single-family home or the introduction of process innovations to reduce pollutant emissions).

It can therefore be seen that actions are preceded by decision-making processes that are quite different in terms of the cognitive effort needed. This applies not only to individuals, but also to groups of individuals such as those represented in households, companies, administrations or other organised groups. Many actions have environmental effects here – energy consumption and driving a car as well as the production and use of industrial and consumer goods, among others.

Governments should correctly address the cognitive processes underlying environmental decisions. Two main cases can be distinguished here: In the first case, it is a question of breaking up existing, environmentally-damaging routines, encouraging a decision to take new environmentally-friendly actions (e.g. in the choice of the mode of transport). Many people tend to stick to routines, and it is important to take this into account, especially in the development of instruments. In the second case, it is a question of motivating people to decide on environmentally-friendly actions in existing decision-making situations (e.g. ecological house renovation or ecological process innovation). In both cases, there are two options: the

addressees either know the environmentally-friendly action already and have carried it out once – so in this case, the action is not new. Alternatively, the addressees have never carried out the eco-action and may also not know how they should proceed. The amount of effort that has to be made in order for an action to be realised at all is therefore relatively great and the result may be uncertain. This can reduce the willingness to choose environmentally-sound actions. This must also be taken into account in the development of instruments.

In any case, the support of the decision-making process should be the central kick-off point for environmental-policy measures. It is therefore important that environmental policy is based on knowledge of the behavioural sciences of decision-making processes and their determinants. For this purpose, the relevant fundamentals are outlined below. Decision-making processes and determinants are also systematised and correlated.

2.2 The decision-making model

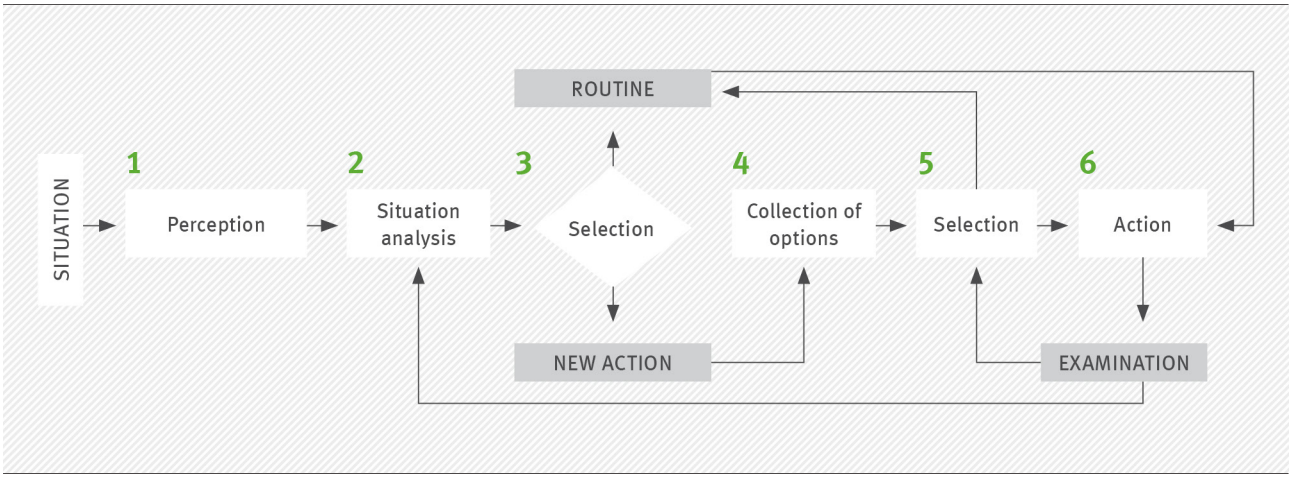
2.2.1 The cornerstones of the decision-making model

As described in section 1.3, behavioural science understands decision-making as a process, which can be more or less complex depending on the subject of the decision. The model of such a process can therefore be very complex. However, a model that is too complex is not suitable for the practical design of environmental-policy measures. Nevertheless, the model should cover the essential aspects of the decision-making process so that they are also taken into account in the specific design of environmental-policy instruments.

A decision-making model that balances complexity and simplification is presented below. It comprises six core phases as its cornerstones: The decision-making process begins with the perception of an environmental-policy instrument and ends with the examination of the action triggered by an instrument (› see Fig. 2). How people go through these individual phases depends on various influencing factors. The six phases of the decision-making model are introduced in the following section.

Figure 2:

The six phases of the decision-making model



Source: Own presentation based on Herbert Simon

2.2.2 The 6 phases of the decision-making model

The decision-making model is based on the research of Herbert Simon. It includes the six major phases of a decision-making process in compressed form. In these six phases, people deliberate, pass judgement, carry out problem-solving processes and make decisions. Ideally, people go through all six phases when dealing with an environmental-policy instrument (**see Fig. 2**), from the perception of the instrument to the environmentally-friendly action. The six phases are outlined below, with reference to the effects of behaviour-oriented, environmental-policy instruments:

1. The first phase, 'perception', is elementary: An environmental-policy instrument only signals a need for decision-making to the addressees if they become aware of it at all and recognise the new situation which is arising for them.

2. The second phase is the 'situation analysis'. In this phase, the addressees ask themselves what the environmental-policy instrument means and which goals it is pursuing. They examine whether the instrument requires a change in their existing, environmentally-harmful courses of action.

3. In the third phase, 'selection of the course of action' takes place, involving a first decision which is made on the basis of the situation analysis. If the instrument aims to change a course of action, which is usually routine for the addressees, they will check whether or not changes in behaviour seem necessary. If there is no need, the usual routine will be maintained and the decision-making process is interrupted. However, if the instrument motivates the addressees to change their behaviour, they decide to look for new, environmentally-friendly options for action and the decision-making process is continued. If the instrument motivates environmentally-friendly actions in completely new situations for which routines are not yet available, a decision is also taken to continue with the decision-making process.

4. If the addressees continue with the decision-making process, the fourth phase, the 'collection of options' takes place. This phase is characterised by an examination of the question of how behaviour can be adapted to match the objectives of the environmental-policy instrument. At this point, the addressees look for new possible courses of action. This process can be very time-consuming, depending on the subject and the new content.

5. The second decision is then made during the fifth phase: the 'selection' of an alternative action. If the environmental-policy instrument is effective, the addressees will opt for an environmentally-friendly alternative. If the instrument is not effective enough, the decision taken may also include environmentally-harmful actions. If routines exist here, the addressees could also decide to keep their usual routines.

6. When the decision to carry out a new action has been made in the fifth phase, the action can take place in the sixth phase. Afterwards, a check is performed to ascertain whether or not the action has brought the desired success. If successful, the action can be continued in the future and established as a routine if repeated. In the event of failure, the decision-making process starts again or repeats previous phases.

2.3 Influencing factors of decision-making processes as seen from a behavioural-scientific perspective

2.3.1 The cornerstones of the influencing factors in decision-making

The above decision-making model comprises six phases of the decision-making process. If everyone was like the concept of a Homo economicus, then the processes of thought, judgement and problem-solving would proceed optimally within these phases. It would not be necessary to support decision-making processes through environmental-policy instruments. Since this is not the case however, it is important to tackle the question, 'Which factors affect the decision-making process?' What bases do people have for making good decisions in increasingly complex environments in their private everyday life or at work? The disciplines of behavioural science

deal with this from different perspectives (see section 1.3). Their findings on influencing factors again form the bases for the following sections. For a better overview, these factors are classified into four categories: 'Limitations', 'Potential', 'Motivators' and 'Diversity' (see Fig. 1).

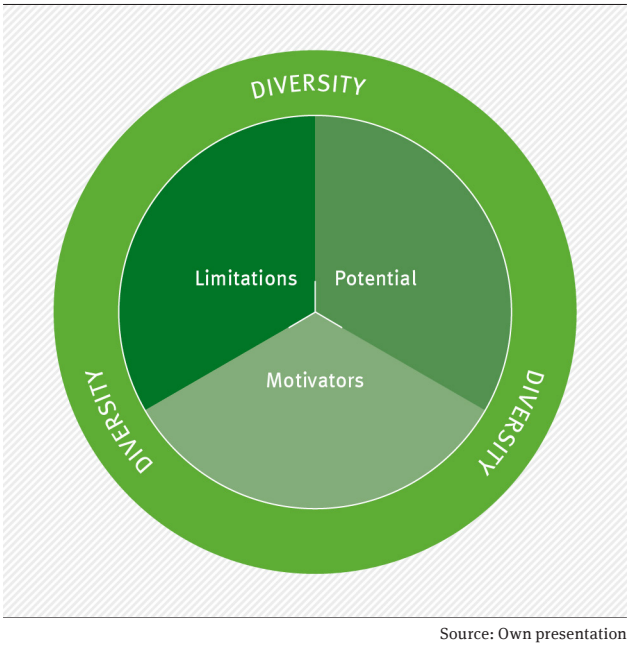
2.3.2 Beschränkungen als Einflussgröße

Behavioural science research indicates that people are limited in their cognitive abilities. They have a limited capacity to absorb, process and develop new knowledge – and relevant information is not always available to a sufficient extent. Herbert Simon speaks of the bounded rationality of man in this context [10]. This also limits the capabilities of human beings to make environmentally-friendly decisions.

More recent behavioural economics research has found that decisions can also be based on systematic 'cognitive distortions' or 'misjudgments'. People misinterpret situations, for example, they can be influenced by the design of images and messages (*framing effects*), overestimate their own abilities (*overconfidence, self-convincing effect*), assign greater weighting factor to potential losses than to potential gains (*loss aversion*) and are negative about changes, even if they these changes would actually be advantageous (*Status Quo effect*). These and many other cognitive distortions are often mentioned in the discussion on behavioural instrumentation. They can also adversely affect the decision-making processes regarding environmentally-friendly actions.

Figure 3:

The four categories of influencing factors in the decision-making process



Source: Own presentation

2.3.3 Potential as an influencing factor

People would not be able to act if they did not have the ability – despite their bounded rationality – to make decisions in the complicated situations of life. Herbert Simon describes this ability as 'procedural rationality' [11]. For example, people have the ability to learn or focus their attention on important aspects, while ignoring the environment at the same time. This also includes the ability to go through problem-solving processes. Memory, thinking styles and personality traits such as creativity contribute to their success (see also section 2.3.4). People are also able to work on solutions to existing problems together with others. Since people differ from one another (see section 2.3.5), individual deficits can be at least partially compensated during interaction with others.

The essential components of procedural rationality also include *heuristics* (rules of thumb or fist). Heuristics are decision-making strategies that are based on more or less simple rules. They can help to structure the search for possible actions (*structuring heuristics*) and/or reduce the number of alternatives considered and ultimately to decide on an alternative (*discriminatory heuristics*). Decisions can thus be facilitated, e.g. when people do not search for an optimal solution until they have found it, but are satisfied with a solution that fulfils a certain level of aspiration (*satisfication*). Heuristics are also based on the experiences of individuals.[2]

2 In reference to the 'Dual-System-Concept' by Kahneman [12], behavioural science is also currently discussing the question of the extent to which heuristics (and consequently decision-making) proceed more or less automatically and unconsciously (System 1) or within the framework of conscious considerations (System 2). Gigerenzer notes that heuristics can contain elements of both systems [13]. This also applies to a great number of influencing factors in the decision-making process.

The potential listed here can now enable people to carry out decision-making processes that have been motivated by an environmental-policy instrument in such a way that the decision is ultimately taken for environmentally-friendly action. However, it should be noted that due to bounded rationality, the carrying out of thought, learning and problem-solving processes, as well as the selection of the heuristics, does not always have to be appropriate – and in this respect the selected action can also lead to a result, which is neither targeted nor desired. With regard to environmental-policy instruments, this may mean that the intended effect of the instrument does not occur.

2.3.4 Motivators as influencing factors

The aspects of limited and procedural rationality presented here are often mentioned in the discussion about behaviour-oriented instrumentation. However, it would fall short of the mark if behavioural instruments only referred to this. Rather, it is also necessary to ask which factors influence the willingness to start a decision-making process in the first place and then to carry it out throughout all the phases. Characteristics of human thinking, judgement and problem-solving can be important here.

Psychology and cognitive science investigate the role of *needs*, *emotions*, *motivations*, *attitudes* and goals as drivers of human behaviour. Specific personality traits, e.g. individual abilities, thinking styles, the extent of creativity and the willingness to try something new (openness for experiences) and to give up old, entrenched behavioural patterns (routines) are also characteristic here. Research also indicates that human characteristics such as the consideration of the interests of others *(altruism), reciprocal action* or the desire for fairness characterise decision-making. In general, the social environment has a significant influence on personality and thus also on individual decisions and actions. Mutual relationships arise, which cause people, for example, to orientate their behaviour on the social environment (observance of the *descriptive or injunctive social norms; conformity*).

Environmental-policy instrumentation is now faced with the challenge of stimulating motivation for environmentally-friendly action. However, activating the 'motivators' influencing factor is not an easy task. For example, motivating people to act in an environmentally-friendly manner in one area (e.g. saving water) can lead to a corresponding de-motivation in other areas (e.g. saving energy), as a behavioural science field experiment established [14].

2.3.5 Diversity as an influencing factor

People who are rationally limited do not all act in the same way. Individual differences such as life experience, the different forms of personality traits or an individual's health status and socio-demographic characteristics can lead to people in the same situation arriving at different results within the decision-making processes. The available time also influences behaviour: Working persons with a tightly-scheduled daily routine are likely to see environmentally-friendly, but time-consuming options for action differently than retirees with a lot of free time.

2.4 The interaction of decision-making phases and influencing factors

A model of the decision-making process was presented in the two preceding sections, and influencing factors in human decision-making processes were subsequently identified. In behavioural science instrumentation, it is essential to know which influencing factors can be significant in which phase of the decision-making process. This enables the designers of environmental-policy instruments to relate them to specific phases and the factors that influence them. There are several starting points in psychology, cognitive science and behavioural economics for the assignment of influencing factors to decision-making phases. These form the basis for the integrated decision-making model, which correlates decision phases and influencing factors in a plausible way (**see Fig. 4**).[3]

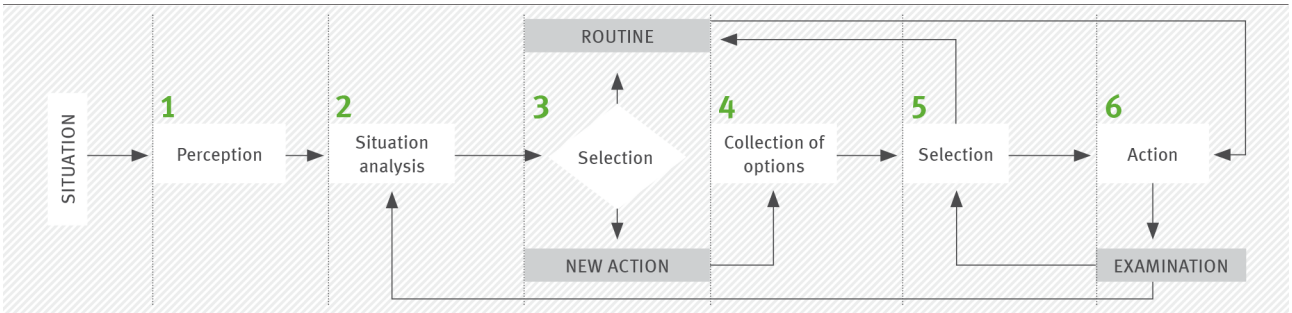
3 This illustration is not exhaustive. For explanations of the individual terms, see the glossary in Annex I.

It can be assumed that the individual aspects of the four influencing factors interact in different ways with the decision-making phases. Bounded rationality thus forms the basis of the entire decision-making process; the cognitive distortions that may be associated with it, however, affect different phases. In the perception phase, framing effects may be significant, so that the way in which the information is created can alone determine whether and how the addressees register the instrument. In the situation analysis phase, cognitive distortions such as the c*onfirmation effect* can play a role. The influencing factor 'Potential', behind which are the characteristics of procedural rationality also produces diverse effects: Structuring heuristics tend to play a more important role in the selection phase, while discriminatory heuristics prevail in the selection phase and, during the evaluation phase, the addressees can possibly examine whether or not their level of aspiration has been reached. The influencing factors 'motivators' and 'diversity' are also effective in correspondingly different ways.

The combination of the phases with the influencing factors affecting them shows that even this relatively 'simple' model already includes many aspects. This is a clear indication that the design of a behaviour-oriented, environmental-policy instrumentation is not as easy as it often appears during discussions.

Figure 4:

Integrated decision-making model



	1 Perception	2 Situation analysis	3 Selection	4 Collection of options	5 Selection	6 Action
I Limitations	▸ Associative activation ▸ Bounded information processing ▸ Framing effect	▸ Limited information processing ▸ Information deficits ▸ Confirmation effect ▸ Mental accounting	▸ Information deficits ▸ Limited information processing ▸ Loss aversion ▸ Status quo effect	▸ Information deficits ▸ Limited information processing ▸ Confirmation effect ▸ Self-convincing effect	▸ Information overflow ▸ Overconfidence ▸ Sunk costs effect	▸ Information deficits ▸ Limited information processing ▸ Self-convincing effects ▸ Moral licensing
II Potential	▸ Focusing of attention	▸ Learning ▸ Level of aspiration ▸ Structuring heuristics (e.g. disintegration heuristics)	▸ Experience ▸ Discriminatory heuristics (such as satisfication, imitate your environment)	▸ Cooperation ▸ Learning ▸ Structuring heuristics (e.g. availability heuristic)	▸ Experience ▸ Discriminatory heuristics (e.g. elimination heuristic, default heuristic)	▸ Adaptation to level of aspiration ▸ Structuring & discriminatory heuristics
III Motivators	▸ Emotion ▸ Curiosity ▸ Openness for experiences	▸ Needs ▸ Attitude ▸ Injunctive social norm ▸ Openness for experiences	▸ Altruism ▸ Intrinsic motivation ▸ Extrinsic motivation ▸ Conformism	▸ Needs ▸ Creativity ▸ Motivation ▸ Openness for experiences	▸ Attitude ▸ Descriptive social norm ▸ Non-conformism ▸ Reciprocal action	▸ Altruism ▸ Motivation ▸ Non-conformism ▸ Social norm
IV Diversity	▸ Health limitations ▸ Temporal resources	▸ Age ▸ Income ▸ Temporal resources	▸ Income ▸ Life experience ▸ Temporal resources	▸ Level of education ▸ Temporal resources	▸ Income ▸ Health limitations	▸ Level of education ▸ Temporal resources

Source: Revised representation according to [15].

3 The instruments of a behaviour-oriented, environmental-policy

3.1 The cornerstones of a behaviour-oriented instrumentation

In the case of behaviour-oriented instrumentation, it is important to consider all six phases of the decision-making process when developing instruments. Behaviour-oriented instrumentation has different tasks in the individual phases:

1. **Perception:** Attracting attention;
2. **Situation analysis:** Facilitate situation analysis and encourage goal setting;
3. **Selection of the course of action:** Support in decision-making, carrying out new, environmentally-friendly actions and breaking routines;
4. **Collection of options:** Help with the reminder of known options for courses of action and with the search for new possibilities for action;
5. **Selection of an action:** Motivation to decide on a target-oriented action;
6. **Evaluation:** Supporting the evaluation of the outcome of the action; if this does not have sufficient impacts on the environment, encourage the development of appropriate responses.

Instrumentation in all six phases should also address the four categories of influencing factors. Behaviour-oriented instrumentation faces the following challenges:

1. **Limitations:** Help to avoid wrong decisions based on bounded rationality;
2. **Potential:** Support the potential which creates the decision-making ability;
3. **Motivators:** Consideration of the internal and external motivators of the decision-making ability and their interaction;
4. **Diversity:** Consideration of the different starting conditions of the environmental-policy addressees.

Environmental-policy instrumentation based on behavioural-scientific principles also (necessarily) takes into account the relationship between the phases and the factors that influence decision-making processes. For this purpose, the integrated decision-making model in section 2.4 provides suggestions and shows which influencing factors can be effective in which phase. The following sections present a catalogue of behaviour-oriented instruments. The catalogue meets the requirements of behavioural science and includes the traditional instruments of environmental policy.

3.2 Conventional and behaviour-oriented instruments of environmental policy in context

Can the requirements for behaviour-oriented instrumentation formulated in the previous section also be met by traditional environmental-policy instruments? These are usually divided into five categories:

A. **regulatory instruments** such as imperatives and prohibitions (do's and don'ts)
B. **legislative planning instruments** such as water-related management plans,
C. **classical economic instruments** such as taxes and subsidies,
D. **information instruments** such as labels and publication obligations,
E. **cooperative instruments** such as voluntary agreements with perpetrators of environmental damage.

The effects of these instruments are, if at all, explained on the basis of the concept of Homo economicus. However, the requirements for behaviour-oriented instrumentation formulated in the previous section directly illustrate why these

instruments are limited in their effectiveness: They address the real foundations of human decision-making insufficiently. However, humans are only rational in a limited manner, so imperatives and prohibitions (do's and don'ts), for example, and even information instruments do not necessarily achieve the desired effect. At the same time, it cannot be assumed that an efficient market development will happen, so the classic, economically-oriented instruments will also have a limited effect. Last but not least, the effect of cooperative instruments is also insufficient if they do not address the behavioural-scientific principles of human decision-making and interaction.

Against this background, science and environmental policy face the challenge of developing appropriate behaviour-oriented instruments. These instruments can then be used both as independent instruments and to complement and improve existing instruments.

How would such instruments look? A catalogue of instruments was developed for this purpose as part of the INCENT II project [16]. It contains four classes of behaviour-oriented, environmental-policy instruments, which also include the traditional environmental-policy instruments (see Fig. 5):

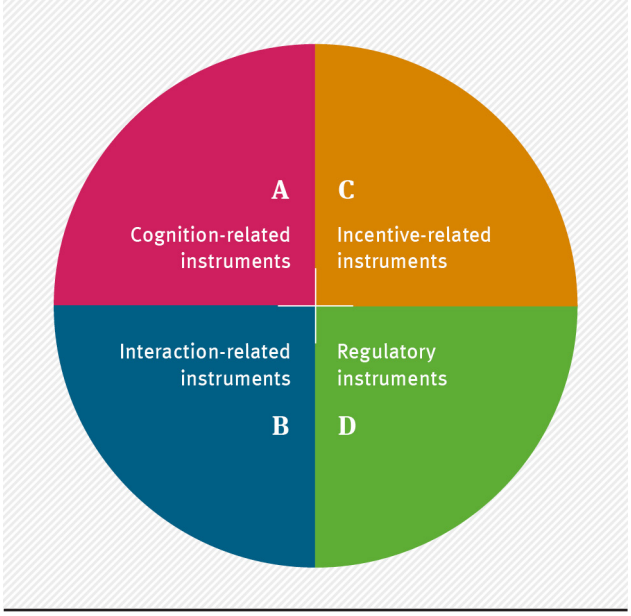
A. **Cognition-related instruments:** This class contains instruments which aim at processes of perception, information intake & processing and cognitive motivation. This includes the traditional informational instruments of environmental policy, if they are aimed at informing the addressees (but not, for example, if they require information from the addressees as in the case of the publicity obligation).

B. **Interaction-related instruments:** This class includes instruments aimed at the interrelationships between the actors. It also includes the cooperative instruments of environmental policy.

C. **Incentive-related instruments:** This class includes instruments designed to motivate addressees to act in an environmentally-friendly manner by means of positive or negative incentives. The class also includes the classical economic instruments.

Figure 5:

Classes of the behaviour-oriented instrument catalogue



Source: Own presentation

D. **Regulatory instruments:** This class includes instruments that limit decision-making freedom by prescribing, excluding or reducing the scope for action. These are the regulatory and legislative planning instruments.

3.3 The catalogue of behaviour-oriented instruments in detail

The four instrument classes mentioned in the previous section form higher-level categories, which can be assigned to different operative instruments that can be applied in a specific way. The INCENT II project developed relevant proposals [16], which are based on state-of-the-art research, including an evaluation of practical policy implementations and field experiments carried out in the INCENT II project (see latter [17]). The following paragraphs present these operative instruments and show which operative instrument can be relevant for the phases and influencing factors of the decision-making model.

3.3.1 The operative cognitive instruments

As described in section 3.2, the class of cognitive instruments aims at the processes of perception, information intake & processing and cognitive motivation. It contains six operative instruments which partially build on one another and thus should not be regarded as being individually-effective instruments, but as components of an instrument bundle. Cognitive instruments are of fundamental importance and should always be taken into account. They can be differentiated as follows:

1. **Information presentation and communication:** This operative instrument is designed to help people understand and process the information necessary for the decision-making process. A simple language, an appealing visual design and simple, behaviour-oriented information graphics[4] reduce the 'limitations' through limited information processing ability or cognitive distortions (such as *mental bookkeeping* or loss aversion).

2. **Generation of attention:** This operative instrument encompasses all the measures aimed at attracting the attention of the addressees to environmental-policy measures, thus promoting the 'perception' of the instrument at the same time – e.g. through an eye-catching graphic design or meaningful messages.

3. **Motivational and behavioural strengthening:** This operative instrument targets the strengthening of *intrinsic motivation*. This can be done, for example, through an invitation to participate or through the suggestion of an environment-related objective, encouraging the motivation of the addressees. However, it must be noted that this instrument does not have the same effect on everyone. The extrinsic stimulus imparted by the instrument can thus destroy a pronounced intrinsic motivation in some persons.

4. **Information on facts:** This operative instrument includes the transfer of information, which is necessary for environmentally-friendly actions. This includes, for example, the presentation of facts (e.g. through labels) or feedback on the environmental impact of the addressees' actions. This operative instrument thus helps to alleviate limitations in the form of information deficits; and it also helps the addressees to see the results of their actions.

5. **Information on possible courses of action:** This instrument ensures that during the phase of the collection of options, courses of action that are as specific and simple as possible are available for environmentally-friendly action. This helps to strengthen the potential of the addressees.

6. **Facilitation of decision-making:** This operative instrument targets a strengthening of the potential for the two selection phases of the decision-making processes. This is done, for example, by pre-sorting the information about the possible courses of action. In this way, the options for action can be ranked according to their environmental impact. A pre-setting (default), which must be actively de-selected, can also serve as a kind of information filter.

The above explanations about the six operative cognitive instruments have already shown examples of the phases and influencing factors of decision-making processes that can be addressed in each case. Table 1: provides a more detailed overview of the phases of the decision-making model in which the operative cognitive instruments can mainly have an impact. It refers to relevant differences between the phases. For example, the 'preparation of information and communication' instrument is important for all the phases, apart from those during which decisions are made. The 'facilitation of decision-making' operative instrument, on the other hand, is solely relevant for the decision-making phases. Whenever instruments present the outcome of actions this is important for the evaluation phase.

4 Pronounced examples from health research show how important it is for the perception, processing and evaluation of content to be visualised in a behavioural-scientific context. Studies have shown, for example, that patients can better assess the risk of medical measures through appropriately prepared information [18]. The INCENT II project systematised the previous findings using the example of the behaviour-based design of electricity bills and energy reports [19]. Here, too, the results indicate that graphically well-prepared content is actually better understood and thus contributes to a better impact of the instruments.

Such differences can also be expected with regard to the interaction of instruments and influencing factors. Table 1 shows the possible interaction of influencing factors and operative cognitive instruments. For example, it can be assumed that the 'information presentation and communication' operative instrument has an effect on all influencing factors, but that the 'motivational and behavioural strengthening' instrument only affects 'motivators' and 'diversity'.

Table 1:

Operative cognition-related instruments and phases of the decision-making model

Instrument class	Operative instrument	Phases of the decision-making model					
		1 Perception	2 Situation analysis	3 Selection	4 Collection of options	5 Selection	6 Action/ Evaluation
Cognition-related instruments	Preparation of information and communication	X	X		X		X
	Generation of attention	X					
	Motivational and behavioural		X	X			
	Information on facts	X		X	X		X
	Information on possible courses of action				X		X
	Facilitation of decision-making			X		X	X

Table 2:

Operative cognition-related instruments and phases of the decision-making model

Instrument class	Operative instrument	Influencing factors in decision-making processes			
		Limitations	Potential	Motivators	Diversity
Cognition-related instruments	Information presentation and communication	X	X	X	X
	Generation of attention	X			X
	Motivational and behavioural			X	X
	Information on facts	X	X		X
	Information on possible courses of	X	X		X
	Facilitation of decision-making		X		X

3.3.2 The operative interaction-related instruments

The interaction-related instruments target the interactions between the actors. Two forms can be distinguished here: In one case, the instrument focus is on how a person reacts to the demands of his or her environment, and in the other case it targets the direct interaction between people. The following list includes six operative interaction-related instruments, which can be combined:

1. **Addressing of social inclusion:** This operative instrument highlights the importance of individual action for the community. This can be done, for example, by providing information about the environmental impact of one's own actions on the place of residence or workplace.

2. **Appeal for descriptive social norms:** This operative instrument motivates addressees to make environmentally-friendly decisions by comparing the environmental consequences of their actions with the corresponding results of others. One example of this is the comparison of the energy consumption of one household with that of other relevant households (e. g. in the area of neighbourhoods and city districts).

3. **Appeal for injunctive social norms:** This operative instrument includes appeals for socially-desirable and environmentally-friendly actions. This appeal also has a potentially motivating impact.

4. **Social competition:** This operative instrument relies on the motivation of addressees by initiating time-limited competitions. Examples of this are competitions for energy saving between companies or between neighbouring households or municipalities. The instrument can also strengthen the potential of the addressees. A prerequisite for this is that it is not individual persons, but groups that compete with one other. Through the exchange of information and ideas or even everyday articles within the groups, participants can develop new possible courses of action, which they would not be able to achieve on their own, or only achieve with more effort.

5. **Agreement:** This operative instrument relies on cooperation between and with the addressees of the environmental policy. Through personal and respectful interaction, they can develop reciprocal relationships and jointly evaluate possible courses of action. The instrument can have a motivating effect in all phases. Examples of this instrument are energy consultations that take place at consumers' homes or in companies, but also agreements between companies and supervisory authorities, and voluntary self-commitments.

6. **Cooperation:** This operative instrument relies on cooperation between and with the addressees of the environmental policy. In this way, individual restrictions can also be balanced and the potential of the addressees strengthened. This mutual exchange can lead to the building of trust and the perpetuation of joint efforts to act in an environmentally-friendly manner. Examples of this are the merging of consumers into energy cooperatives or of companies into energy efficiency networks.

In order to ensure and strengthen the effectiveness of the interaction-related instruments, they should always be used in conjunction with cognition-related instruments – because interactive instruments have always to be communicated and understood as well. This is why the designers of environmental-policy instruments should ensure, for example, that the interactive instrument is simple, easy to understand and clearly arranged in terms of graphics and content. Interaction-related instruments can only be effective if the addressees have a relevant level of knowledge about actions. The interaction-related instruments can be easily linked with the 'information about possible courses of action' cognitive instrument. Conversely, they can also contribute to strengthening the 'generation of attention' instrument by, for example, positioning an appeal for the injunctive social norm at the centre of attention.

Table 3 summarises the relevant effects of the operative interaction-related instruments on the individual phases of decision-making processes. The list shows that all the instruments can affect the situation analysis and the selection phase. This is due to the motivating character of these instruments (**‣ see Table 4**). If the interaction-related instruments provide for direct exchange between the addressees, this can also have a positive effect on the collection of options phase. If the instruments are also designed for a repeated interaction, they will also play a role in the evaluation phase.

Table 4: gives an overview of the influencing factors that can be addressed by the operative interaction-related tools. In this case, it is assumed that all the instruments affect the motivators influencing factors. Those instruments that involve direct interaction with other addressees can contribute to the reduction of 'restrictions' and to the strengthening of 'potential' by means of the different equipment of the individual persons. However, it is also possible that the interaction-related, environmental-policy instruments will not have any effect due to the diversity of human beings. This can happen, for example, in the case of people who place little value on social norms (*non-conformity*) or those who do not like to interact with others.

3.3.3 Operative incentive-related instruments

Incentive-related instruments aim to motivate the addressees of the environmental policy by means of positive or negative incentives to act in an environmentally-friendly manner. Incentives can be of an informational, objective or monetary nature.

Specifically, the incentive-related instruments can be differentiated as follows:

- Positive incentives: Positive incentives include, for example, the presentation of the individual or collective advantages of an environmentally-friendly action (e.g. the reduction of environmental damage). This also includes monetary incentives in the form of e.g. rewards for environmentally-friendly actions, prize money for competitions or subsidies for environmentally-friendly production.

- Negative incentives: The negative incentives include sanctions for undesirable behaviour. These can be monetary in nature, e.g. by increasing the cost of electricity per unit of consumption if electricity consumption is higher. They also include classic economic instruments such as taxes and levies.

As in the case of the interaction-related instruments, the incentive-related instruments should only be used in combination with the cognition-related instruments. It is also conceivable to use cognition, interaction and incentive-related instruments together. One example here would be the nationwide initiation of regional corporate energy-saving networks, which compete with one another for the best places and receive appropriate information on the possibilities of saving energy to help them win. The winners would benefit from receiving support for further energy savings and the public announcement of the winning groups.

Incentive-related instruments are particularly important for the phases of situation analysis and the selection of the options for courses of action (**‣ see Table 5**). For example, a financial grant for the implementation of an environmentally-friendly action could extend the envisaged options for courses of action if the addressees of the instrument do not have the necessary financial resources at their disposal. However, it is also possible that these instruments work in other phases, for example, when the 'generation of attention' cognitive instrument focuses on the reward.

Table 3:

Operative interaction-related instruments and phases of the decision-making model

Instrument class	Operative instrument	Phases of the decision-making model					
		1 Perception	2 Situation analysis	3 Selection	4 Collection of options	5 Selection	6 Action/ Evaluation
Interaction-related instruments	Addressing of social inclusion		X	X			
	Appeal for descriptive social		X	X			
	Appeal for injunctive social norms		X	X			
	Social competition		X	X	X		X
	Agreement		X	X	X		X
	Cooperation		X	X	X		X

Table 4:

Operative interaction-related instruments and the influencing factors in decision-making processes

Instrument class	Operative instrument	Influencing factors in decision-making processes			
		Limitations	Potential	Motivators	Diversity
Interaction-related instruments	Addressing of social inclusion			X	
	Appeal for descriptive social norms			X	
	Appeal for injunctive social norms			X	
	Social competition	X	X	X	X
	Agreement	X	X	X	X
	Cooperation	X	X	X	X

The incentive-oriented instruments may also affect the influencing factors in decision-making processes. This is especially true of the 'Limitations', 'Motivators' and 'Diversity' categories (**see Table 6**). Here the instruments can help to compensate for cognitive distortions, e.g. to stimulate a deviation from the Status quo (*Status quo Effect*), to strengthen motivation or to level out social inequalities. It should be noted, however, that the effect of incentive-oriented instruments can also be reversed. The reason for this can be, for example, the reduction of intrinsic motivation through the extrinsic incentive.

Table 5:

Operative incentive-related instruments and phases of the decision-making model

Instrument class	Operative instrument	Phases of the decision-making model					
		1 Perception	2 Situation analysis	3 Selection	4 Collection of options	5 Selection	6 Action/ Evaluation
Incentive-related instruments	Positive incentives		X		X		
	Negative incentives		X		X		

Table 6:

Operative incentive-related instruments and influencing factors in decision-making processes

Instrument class	Operative instrument	Influencing factors in decision-making processes			
		Limitations	Potential	Motivators	Diversity
Incentive-related instruments	Positive incentives	X		X	X
	Negative incentives	X		X	X

3.3.4 The operative regulatory instruments

It is characteristic for the regulatory instruments that they exclude the decision-making freedom of addressees or limit it by prescribing mandatory possible courses of action, making this group fundamentally different from the previous instrument classes. In this sense, it comprises only known instruments, i.e. all planning instruments and all administrative control instruments. Nevertheless, it is worthwhile to look at this group of instruments from a behavioural perspective, for which the bounded rationality of the actors is particularly important.

Bounded rationality in this case means that the people cannot obtain a complete overview of the many short-term and long-term environmental impacts of their actions. Cognitive distortions and different 'motivators' of the action can lead to people not carrying out the necessary environmentally-friendly actions, even if they have sufficient information. Seen from this perspective, planning and regulatory instruments are justified. They take effect when people cannot obtain an overview of the consequences of actions or when they do not even wish to consider these consequences, and when the other behaviour-oriented instrument classes are not sufficiently effective.

One behavioural-scientific perspective suggests that regulatory instruments should only be used in conjunction with the operative cognition-related instruments. Here too, it is essential that the (limitedly rational) addressees understand the instrument and can and want to implement it. In this context, it may also make sense to combine the regulatory instruments with the interaction-related or incentive-related instruments. For example, addressing social inclusion can reinforce an imperative to use environmentally-friendly products. Table 7: and Table 8: – on the basis of three selected instruments from the available regulatory instruments – planning, imperatives and prohibitions (do's and don'ts) – make it clear which decision-making phases and which influencing factors of decision-making processes can be of importance here.

The regulatory instruments determine the direction of decision-making processes. They act during the situation analysis phase (here the instrument requires a change of action), the selection phase (here routine treatment is deselected or courses of action are considered for completely new situations for which no routine is available) and the selection of the courses of action (only the prescriptive action can

be selected). If the 'planning' and 'imperatives' (do's) regulatory instruments offer a choice between several possible courses of action, a decision will be made during the selection phase.

Among the influencing factors, for example, the 'Limitations' category is relevant for all three regulatory instruments. Imperatives can also have an impact on the influencing factor 'potential', because they specify an action that the addressees might not otherwise have considered.

Table 7:

Operative regulatory instruments and phases of the decision-making model

Instrument class	Operative instrument	Phasen des Entscheidungsmodells					
		1 Perception	2 Situation analysis	3 Selection	4 Collection of options	5 Selection	6 Action/ Evaluation
Regulatory instruments	Planning		X	X		X	
	Imperatives (do's)		X	X		X	
	Prohibitions (don'ts)		X	X		X	

Table 8:

Selected regulatory instruments and influencing factors of the decision-making model

Instrument class	Operative instrument	Influencing factors of the decision-making model			
		Limitations	Potential	Motivators	Diversity
Regulatory instruments	Planning	X			
	Imperatives (do's)	X	X		
	Prohibitions (don'ts)	X			

3.4 Instrument bundle and perpetuation as prerequisites for a behaviour-oriented environmental policy

The previous sections have shown that the requirements are relatively high if environmental-policy instrumentation also is to address human decision-making processes and the influencing factors that affect them. It has also been shown that (and how) the individual operative instruments of the instrument catalogue address different influencing factors and decision-making phases, and that the cognition-related instruments are fundamental for the perception and understanding of a measure. Cognition-related tools should therefore also be used when the main focus of a measure is on another class of instruments.
In addition, the other instrument classes can also support one other. This points to a fundamental aspect: Behaviour-oriented instrumentation will not be effective with one single instrument – it is always confronted with the challenge of identifying and implementing well-harmonised, target-group-specific instrument bundles [20, 21].

Please note the following, however: Even if instrument bundles result in a decision for an environmentally-friendly action, this does not mean that the action will be repeated in the future. The action can remain a once-only event, triggered by a once-only use of instrument bundles. The aim, however, is to perpetuate environmentally-friendly actions – and this is why it is important to repeatedly use methods and stimuli to trigger environmentally-friendly actions. The example of the energy reports from the USA (**see section 1.4, s. see Fig. 1**) illustrates this: The reports sent out every month or every two weeks resulted in higher average energy savings than the reports sent out every quarter.
In this context, it is advisable to structure the instrument bundles differently over time and, as far as possible, to adapt them in target-specific manner to the successes that have already been achieved.

4 Guide to the development of behaviour-oriented instruments

4.1 The cornerstones of the development of behaviour-oriented instruments

Behaviour-oriented instruments can help to prevent environmental damage. This is shown by the evaluations carried out in the framework of the INCENT II project [17], and also by many other studies (**see to an overview [1, 21, 22]**). However, we do not yet know enough about how to develop behaviour-oriented instruments and what needs to be considered. Here the OECD [2] generally recommends that behavioural-scientific findings should be taken into account from the outset and not when a policy measure has already been established. Like the authors of a study by the European Commission [1], the OECD also stresses the need to scientifically test the impact of behaviour-oriented instruments in a first step through controlled field studies. In a second step, the instruments can be adapted and ultimately used in practice. The Behavioural Insights Team[5] in England has a similar procedure. The approach of Françoise Waintrop's[6] team in France is similar, but somewhat different methodically. This team examines the relevant behaviour of people in ethnographic studies, develops instruments from the results and tests these by means of observation. In this context, it recommends regarding instrument development as a development process, which ranges from problem analysis to content-related analysis and empirical examination. The first cornerstones that are important for the development of behaviour-oriented instruments are thus addressed:

- The design and implementation of behaviour-oriented, environmental-policy instruments is a process in which instruments are first developed, then tested and finally used if the tests prove successful.

On what basis can the development of suitable instruments therefore be carried out? There is no systematic approach to this so far. However, this policy paper now offers the prerequisites for this: The basis is the integrated decision-making model and the associated catalogue of behaviour-oriented instruments (**see sections 2 and 3**). The second cornerstone for the development of behaviour-oriented instruments has therefore been specified:

- The design of behaviour-oriented, environmental-policy instruments must be focused on the phases of the decision-making process and their possible influencing factors. The operative instruments contained in the instrument catalogue can be used to this end. Several instruments should always be combined to form instrument bundles, for which the cognition-related instruments form the basis.

However, one question remains unanswered: Which methods are suitable for developing and testing behaviour-oriented instruments? Are they rather qualitative methods [7], as applied in the French approach, or are they quantitative methods [8], as proposed by the OECD (et alia)? Both approaches are appropriate from the perspective of this policy paper: It makes sense to apply different methods in the respective phases of the development process.

5 The 'Behavioural Insights Team' is an organisation in England in which the state is also involved. It is devoted to the application of behavioural sciences. Its main aim is to achieve better results in public service by using a more realistic model of human behaviour [than that of Homo economicus; author's note] in http://www.behaviouralinsights.co.uk/about-us/ (see Behavioural Insights Team: http://www.behavioralinsights.co.uk/about-us/; Status as of: 06.06.2017).

6 Françoise Waintrop is the head of 'Nudge France', a state department located in the French government offices of the 'Secrétariat Général à la Modernisation de l'Action Publique' (SGMAP) (see http://www.nudgefrance.org/; Status as of 06.06.2017) The information presented here is based on a lecture by Françoise Waintrop on 30.03.2017 as part of the 'Behavioural Science and the Policy of Simplification' conference in Menaggio, Italy.

7 Qualitative methods, in contrast to quantitative methods, usually have a rather open character. They target just a few persons and can be used to explore a possible field of research. Qualitative methods include participating observations, in-depth interviews and group and expert discussions. One application example here is the study of energy consumption behaviour. It is interesting to observe people in their natural environments and use the results for the development of instruments.

8 Quantitative methods target a greater number of people. It is important that these persons represent a mean selection from a target group. This procedure is less explorative in nature, since pre-defined facts are investigated (e.g. the question of whether the interactive instrument 'Social Norm' encourages employees to save energy more than the incentive-oriented instrument 'Financial Incentives'). These methods include surveys and laboratory & field experiments Laboratory experiments investigate the effect of an instrument under artificial but controlled conditions. The effect of an instrument in real life is investigated In field experiments. A control group is necessary in both cases. It is usually advisable to carry out qualitative studies first, followed by quantitative studies.

Such a mix of methods makes it possible to investigate the effects of instruments in depth where it is necessary and, where appropriate, to investigate the effects of instruments on a broad basis. This addresses the third cornerstone of instrument development:

- To develop and test behaviour-oriented, environmental-policy instruments, it makes sense to use a combination of different qualitative and quantitative empirical methods (method mix).

The development process itself is also a complex decision-making process from a behavioural-scientific perspective, because none of the persons who design behaviour-oriented instruments are Homines economici – therefore the influencing factors of the decision-making process described in section 2.3 of this policy paper also apply here. Designers should take this into account when selecting and developing instruments and seek support where their own capacities are insufficient.

In the following section, a guide for the development of behaviour-oriented instruments is introduced, based on the three cornerstones. The development is conceived as a process which contains eight steps (**see Fig. 6**).

Figure 6:

The development process of behaviour-oriented instruments

Source: Own presentation

4.2 The development of behaviour-oriented instruments in eight steps

The development of behaviour-oriented instruments is a process in which eight steps of information gathering, the development of ideas and empirical verification intertwine. It is advisable to implement these eight working steps in the specially-developed checklist for the design of behaviour-based interventions (**see section 4.3; Table 9**)[9]. Using this checklist ensures that an intervention systematically addresses all relevant aspects.

1 Problem specification: In this first step, the problem has to be recognised, understood and documented. This involves an examination of the environmental problems that the measure is intended to solve. The environmental-policy objectives of the measure and the target groups must be defined. Participation by citizens' and interest groups as well as expert interviews can provide helpful support for these aspects. The results are entered in the checklist (Item 1).

2 Existing courses of action and decision-making situations: In this step, we first look at how the addressees deal with the environmental problems. Here it is important to examine which practices can lead to the respective environmental problem and whether routine treatments are available here. Qualitative research methods, such as in-depth interviews or participatory observation, help to gain a better understanding of the practices action and decision-making processes, as well as the underlying logic of action. You can also record possible target group-specific differences between the addressees. The results are entered in the checklist (Item 2). If relevant differences between the target groups exist or are to be expected, a checklist should be created for each target group which is to be considered separately. This must also be taken into account in the following steps.

3 Desired actions, promoting and inhibiting factors: Following the review of existing courses of action, it must now be determined which actions should be motivated by behaviour-oriented instrumentation. Perhaps these options for courses of action are new for the addressees and perhaps not. Here you must examine how the target groups assess the alternative actions, which influencing factors of the 'limitations' category act as inhibitors, which 'potential' exists and which 'motivators' contribute to the acceptance of the alternative actions. In each case, you must also check whether the alternative actions lie within the scope of possibility for the addressees and the target group-specific 'differences' that exist. The integrated decision model, which merges decision-making phases and influencing factors, provides a substantive basis for this (**see Fig. 4**). Here too, conducting qualitative studies contributes to a more precise understanding of the possible potential and problems. The results are entered in the checklist (Item 3).

4 Development of behaviour-oriented instruments: The development of behaviour-oriented instruments takes place in this step. The aim of these instruments is to enable and motivate the addressees to carry out new, environmentally-friendly actions. The development of the instruments is therefore based on the findings obtained in the second and third steps. All four classes of instruments in the catalogue of behaviour-oriented instruments must be taken into account. Tables 1, 3, 4 and 7 in the policy paper show which operational instruments address which influencing factors, thus providing support for planning. The development of the instruments should continue to be supported empirically (e.g. through in-depth interviews, surveys and laboratory experiments). As in the following steps, special attention must be paid to the possible unintended effects of the instruments. The results are entered in the checklist (Item 4).

9 The checklist can also be found in Appendix II, where the fields are kept free for labelling.

5 Selecting instrument bundles: Now select two or three suitable instrument bundles from the instruments developed in the fourth step; if possible, the selected bundles should address all the phases of the decision-making process. In addition, cognition-related instruments should always be combined with other instrument classes. Tables 2, 4, 6 and 8 in the policy paper show which operational instruments address which decision-making phases, thus providing support for the selection process. A plausibility check must then be carried out to determine possible unintended steering effects. Here too, discussions with participants and experts can be helpful. The results are entered in the checklist (Item 5). In this context, it is advisable to check whether the selected instrument bundles address the relevant influencing factors determined in the third step (**‣see the 'Check' column in Item 3**). It is also important to ensure that the instrument bundles do not only have a one-off effect. In the event of failure, steps 1-5 (or one or more of these steps where necessary) should be repeated.

6 Testing of instrument bundles and final selection: This step serves to determine which of the instrument bundles identified in the fifth step should actually be used. Field studies or field experiments are carried out for this purpose. For smaller target groups, interviews on behavioural change are also recommended. Select the instrument cluster which promises the best possible results, based on the results of these tests. When the results are entered in the checklist (Item 6), a comparison can be made with the original objective in Item 1 (**‣see the 'Checkbox' in Item 1**). If the set goals have not been achieved, steps 1-6 (or one or more of these steps where necessary) must be carried out again.

7 Application in practice & reviewing the instruments: The final implementation of the instrument bundle takes place in this step. Here it is advisable to continuously examine the effects. Discussions with experts and/or quantitative evaluations of the results can be helpful to this end. If problems or side-effects occur or if the instruments do not work, repeat steps 1-6 (or one or more of these steps where necessary).

8 Communication of success and/or failure: As research on behaviour-oriented instruments and their testing has not yet been completed, it is important to publicly communicate the procedure and the positive and negative results (**‣see also [1]**).

4.3 The checklist for the development of behaviour-oriented instruments

The following checklist (**see Table 9**) contains brief explanations on individual aspects of the eight steps. Annex II contains a blank checklist, which is useful for practical implementation.

Table 9:

Checklist for the development of behaviour-oriented instruments

1. Problem specification				*Check*
METHODS	**Citizen/Interest group participation, talks with experts...**			
Problem definition	*What problems exist?*			
Target definition	*What environmental-policy goals should be achieved?*			
Target groups	*Which target groups should be addressed?*			
2. Existing courses of action and decision-making situations				
METHODS	**Participatory observation, in-depth interviews, discussions with experts**			
Bestehende Handlungsweisen	*Which actions and decision-making situations should be observed? Are there any target group-specific differences?*			
3. Desired actions, promoting and inhibiting factors				*Check*
METHODS	**In-depth interviews, focus group discussions, laboratory experiments ...**			
Influencing factors:	*Action 1*	*Action 2*	*Action 3*	
Limitations	*Which limitations could possibly be effective?*			
Potential	*Which potential has to be activated for a course of action to be carried out?*			
Motivators	*Which motivators should be supported?*			
Diversity	*What differences exist?*			
4. Development of instruments				
METHODS	**Discussions with experts, in-depth interviews, surveys, laboratory experiments...**			
Cognition-related instruments	*Which cognition-related tools are effective?*			
Interaction-related instruments	*Which interaction-related instruments are effective?*			
Incentive-related instruments	*Which incentive-related instruments are effective?*			
Regulatory instruments	*Which regulatory instruments are effective?*			
5. Selection of instrument bundles				
METHODS	**Participation of citizens' interest groups, discussions with experts and focus groups**			
Influencing variables	*Instrument bundle 1*	*Instrument bundle 2*	*Instrument bundle 3*	
Are all phases of the decision-making process covered?	*Covered?*			
6. Testing of instrument bundles and final selection				
METHODS	**Field experiments, field studies (with control groups), in-depth interviews...**			
Effect of the instrument bundles	*How effective are the instruments? Are there any unwanted side effects? If there are side effects, check, change and carry out steps 1–5 again.*			
Selection	*Which instrument bundle is to be selected?*			
7. Application in practice & reviewing the instruments				
METHODS	**Discussions with experts, statistical analyses of relevant parameters...**			
Effect achieved by the instrument bundle	*How effective are the instruments? Are there any unwanted side effects? If there are side effects, check, change and carry out steps 1–7 again.*			
8. Communication of success and/or failure				

5 Governmental action is necessary for the systematic investigation of behaviour-oriented instruments

There are already sufficient examples, which show that behaviour-oriented, environmental-economic instruments are indeed effective. They can thus help to implement governmental interventions more effectively (**see e.g. [1, 21, 22]**). Behaviour-oriented interventions have great potential when it comes to achieving environmental-policy objectives faster and more efficiently in the future. This is also shown by evaluations of the procedure and the results of behaviour-oriented projects and field experiments, which were carried out within the framework of the INCENT II project [17].

At present, however, there is still a lack of reliable information on which combinations of instruments will lead to success in which cases. In addition, knowledge regarding the behavioural-scientific fundamentals and the effects of the instruments has still not been sufficiently recorded and developed in a systematic way. The catalogue of behaviour-oriented instruments presented in this policy paper and the associated integrated decision-making model now provide a comprehensive basis for this. The above-mentioned evaluations of the INCENT II project show how well it works and how helpful it is, not only for the comparison of interventions, but also for a better understanding of the interventions.

Against this background, the UBA proposes to create a Federal Government and/or European Union-level central database, in which the successes and failures of behaviour-oriented instrumentation would be registered. In this context, it is recommended that the classification developed in this policy paper by decision-making processes, influencing factors and instrument classes be used. The checklist developed in this policy paper should be used for the design of behaviour-oriented, environmental-economic instruments (**see section 4.3**) The checklist can not only help to carry out the interventions, but also to systematise them. On this basis, it is possible to compare the effects of different interventions clearly and effectively. However, this also entails a call for action to those who carry out behaviour-oriented interventions: Success and failure can only be measured, understood and compared if the measures are systematised and scientifically substantiated. The scientific standard must be observed here.

The systematic evaluation of behaviour-oriented instrumentation can only be successful if a sufficient number of studies on the effects of these instruments are carried out. Currently, there is still a clear need for action and research in this area, and not only with regard to environmental policy. In other policy areas, too, there is no systematic analysis of the foundations of the success – or the failure – of interventions with behaviour-oriented instruments. This is why the UBA is proposing concerted action that will include as many policy areas as possible. This is the only way to obtain and evaluate a sufficient number of results on the effect of behaviour-oriented instruments.[10]

Climate change and many other environmental problems are too urgent that we could allow ourselves to use inefficient instruments. This why we should press ahead with the testing and further development of behaviour-oriented instruments, to enable us to use them reliably on a broad front and at all levels of government as quickly as possible.

10 A combination of results from many departments would have the further advantage that measures which were successful in other areas could be transferred to the instrumentation in the environmental sector.

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Glossary – Annex I

Behavioural effect	Description	Source
Altruism	Altruism describes an orientation of human action that is not directed towards one's own purposes, but rather pursues the betterment of other persons. Strictly speaking, a state of altruism only exists if one does not simultaneously pursue one's own goals through the desired improvement for other persons.	Feigin, S., Owens, G., & Goodyear-Smith, F. (2014): Theories of human altruism: a systematic review. Annals of Neuroscience and Psychology, 1(1), 1-9.
Associative activation	Associative activation (also known as priming) describes a specific cognitive activity that leads to selective perception of a situation or stimulus. This is the case when a stimulus that precedes a situation has activated memory contents which then influence the perception and thus the processing of the situation.	Janiszewski, C., & Wyer, R. S. (2014): Content and process priming: A review. Journal of Consumer Psychology, 24(1), 96-118.
Attitude	Attitudes in the sense understood here are the assessments of a person with regard to an expected outcome of an action. They are based on a set of notions about an action or an object area.	Fishbein, M., & Ajzen, I. (2011): Predicting and changing behavior: the reasoned action approach. New York, Hove: Psychology Press, 75-128.
Availability heuristic	The availability heuristic can be assigned to the group of ▸ structuring heuristics. It characterises the human tendency to remember recent or frequent events more easily than recent or rare events during decision-making situations.	Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. Cognitive Psychology, 5(2), 207-232.
Bounded rationality	The concept of bounded rationality characterises the cognitive limitations of human thought, action and decision-making. Limitations include, e.g. a limitation on the intake and processing of information and the limited capacity of long-term and short-term memories. ▸ Procedural rationality	Simon, H. A. (1987): Bounded Rationality. In: Eatwell, J. et al. (eds.) (1987): The new Palgrave: A dictionary of Economics. London: Palgrave Macmillan UK, 266–267.
Confirmation effect	The confirmation effect describes the human tendency in decision-making situations to mentally ingest and interpret the available information in such a way that it matches one's own opinion of a situation (even if the two do not match objectively)	Mercier, H. (2016): Confirmation (or myside) bias. In: F. Pohl (ed.): Cognitive Illusions: Intriguing Phenomena in Judgement, Thinking and Memory. Abindgdon, New York: Routledge, 99-100.
Conformism	Conformism describes the tendency of people to comply with ▸ social norms.	Cialdini, R. B., & Goldstein, N. J. (2004): Social influence: Compliance and conformity. Annual Review of Psychology, 55, 591-621.
Creativity	The ability to be creative allows people to create new ideas and things in creative processes. How creative a person is depends on the individual conditions and the environment.	Csikszentmihalyi, M. (2014): Society, culture, and person. In: Csikszentmihalyi: A systems view of creativity. Dordrecht [et al.]: Springer, 47-61.
Default heuristic	This ▸ heuristic belongs to the group of ▸ discrimination heuristics – it describes the tendency of people to choose a standard option (the default option) in decision-making situations.	Gigerenzer, G. (2010): Moral satisficing: Rethinking moral behavior as bounded rationality. Topics in Cognitive Science, 2(3), 528-554.
Descriptive social norm	Descriptive ▸ social norms characterise a person's perception of how other people behave in similar situations. Depending on the form of individual ▸ conformity (inter alia), people tend to behave in accordance with the perceived descriptive norms.	Cialdini, R. B. (2003): Crafting normative messages to protect the environment. Current Directions in Psychological Science, 12(4), 105-109.
Discriminatory heuristics	Discrimination heuristics are ▸ heuristics that help to make a choice between alternatives with relatively little cognitive effort.	Beckenbach, F. (2016): Innovative behavioral approaches to analyze the incentives of environmental instruments. In: F. Beckenbach, & W. Kahlenborn (eds.): New Perspectives for Environmental Policies through Behavioral Economics. Berlin: Springer, 15-68.

Behavioural effect	Description	Source
Elimination heuristics	The elimination rule can be included in the group of ▸ discrimination heuristics. It describes a procedure according to which actions are gradually excluded from all the known possible courses of action, until at the end only one possibility remains; and this last remaining course of action is then taken.	Tversky, A. (1972): Elimination by aspects: A theory of choice. Psychological Review, 79(4), 281-299.
Emotion	Emotions are short-term, positively or negatively perceived inner feelings that are triggered by a situation. Emotions can contain physiological, emotional, cognitive and social components and have a decision-guiding effect. They are also based on people's experiences and the cultural context.	Niedenthal, P. M., & Ric, F. (2017): Psychology of emotion. New York, Hove: Psychology Press, 2-18.
Extrinsic motivation	Extrinsic motivation describes incentives that third parties use to motivate people to act. ▸ Motivation	Ryan, R. M., & Deci, E. L. (2017): Self-determination theory: Basic psychological needs in motivation, development, and wellness. New York: Guilford Publishing, 3-29.
Focusing of attention	This term describes the ability of a person to concentrate on one important aspect and to suppress everything else.	Simon, H. A. (1999): The many shapes of knowledge. Revue d'économie industrielle, 88(1), 23-39.
Framing effects	Framing describes the influence that the way in which information is designed and formulated has on how it is perceived and processed by the recipient.	Tversky, A., & Kahneman, D. (1985): The framing of decisions and the psychology of choice. Environmental Impact Assessment, Technology Assessment, and Risk Analysis. Berlin, Heidelberg: Springer, 107-129.
Heuristics	Heuristics are cognitive processes in which relatively simple rules are used to assess situations and make decisions. Based on existing capabilities, they use environmental structures and allow predictions about the outcome of an action. We can distinguish between ▸ discriminatory heuristics and ▸ structuring heuristics, whereby one heuristic can also fulfill the characteristics of both types.	Gigerenzer, G., & Brighton H. (2011): Homo heuristics: why biased minds make better inferences. In: G. Gigerenzer, R. Hertwig & T. Pachur (eds.): Heuristics: The foundations of adaptive behavior. New York [et al.]: Oxford Univ. Press, 2-30.
Imitate your environment	Imitate your environment is a heuristic of the ▸ discriminatory heuristics group. It describes the tendency of people in decision-making situations to choose the action performed by persons belonging to their own reference group.	Gigerenzer, G. (2010): Moral satisficing: Rethinking moral behavior as bounded rationality. Topics in Cognitive Science, 2(3), 528-554.
Injunctive social norms	Injunctive ▸ social norms characterise a person's perception of the behaviour that is desired by others in a certain situation and should therefore be carried out by him or her.	Cialdini, R. B. (2003): Crafting normative messages to protect the environment. Current Directions in Psychological Science, 12(4), 105-109.
Intrinsic motivation	Intrinsic motivation is the ▸ motivation to actions, which people develop on the basis of their own ▸ needs.	Ryan, R. M., & Deci, E. L. (2017): Self-determination theory: Basic psychological needs in motivation, development, and wellness. New York: Guilford Publishing, 3-29.
Level of aspiration	Individuals or organisations set themselves goals by which they align their actions. The level of aspiration describes the level of these goals. The level of aspiration depends on previous experience and knowledge (inter alia); it is also oriented on the experiences of third parties. Once an action has been carried out, the result is compared with the level of aspiration. If the results of actions exceed or fall below a level of aspiration, it can be raised or lowered. ▸ Satisfication	Simon, H. A. (1987): Satisficing. In: J. Eatwell, M. Milgate, & P. Newman (eds.): The New Palgrave: A Dictionary of Economics, Vol. 4: Q-Z, London: Palgrave Macmillan, 243-245.
Loss aversion	Loss aversion means that people tend to attach greater weight to potential losses than to potential gains. As a result, people tend to take higher risks to avoid a loss than to make a profit of the same amount. In terms of loss, they therefore look for risks, while in terms of profit they are averse to taking risks.	Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991): Anomalies: The endowment effect, loss aversion, and status quo bias. The Journal of Economic Perspectives, 5(1), 193-206.

Behavioural effect	Description	Source
Mental accounting	Mental accounting refers to the way people mentally categorise their financial activities. They tend to have different (mental) accounts for one and the same item(s) to which they allocate incoming and outgoing payments and for which they set budgets. Incoming and outgoing payments of the same amount or for the same item(s) can be evaluated differently (positively or negatively), depending on the mental allocation.	Thaler, R. (1985): Mental accounting and consumer choice. Marketing science, 4(3), 199-214.
Moral licensing	Moral licensing describes the tendency of people not to care about the consequences of a morally-motivated second action (shortly) after they have carried out a morally-motivated first action where they did care about the consequences. This effect can be so strong that the negative consequences of the second action exceed the positive effects of the first action.	Blanken, I., van de Ven, N., & Zeelenberg, M. (2015): A meta-analytic review of moral licensing. Personality and Social Psychology Bulletin, 41(4), 540-558.
Motivation	The motivation of people is an individual driver of targeted behaviour. It is based on ▸ needs, motives and goals and is situation-dependent. A distinction can be made here between ▸ extrinsic motivation and ▸ intrinsic motivation.	Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014): Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. Psychological Bulletin, 140(4), 980-1008.
Needs	Needs can be both physiological and psychological. They fundamentally determine what we do, since human beings strive to satisfy their needs. Physiological needs include thirst and hunger, while psychological needs include e.g. experiencing competence, autonomy and social integration.	Ryan, R. M., & Deci, E. L. (2017): Self-determination theory: Basic psychological needs in motivation, development, and wellness. New York: Guilford Publishing, 3-29.
Non-conformism	Non-conformism describes the inclination of people not to adhere to ▸ social norms and to possibly reject them.	Santee, R. T., & Maslach, C. (1982): To agree or not to agree: Personal dissent amid social pressure to conform. Journal of Personality and Social Psychology, 42(4), 690.to conform. Journal of Personality and Social Psychology, 42(4), 690.
Overconfidence	Overconfidence refers to the tendency of people to overestimate their own possible courses of action.	Moore, D. A., & Healy, P. J. (2008): The trouble with overconfidence. Psychological review, 115(2), 502-517.
Problem-solving processes	A problem-solving process begins with the perception of a difference between an initial situation and a desired target status. In a problem-solving process, the problem sphere is broken down into individual sections to solve the problem; these sections can then be processed individually (e.g. by means of different heuristics). Problem-solving processes can entail varying degrees of complexity, e.g. the initial situation and the targets may be unclear.	Simon, H. A. (1990): Invariants of human behavior. Annual Review of Psychology, 41(1), 1-20.
Procedural rationality	The concept of procedural rationality encompasses the cognitive potential of human thought, action and decision-making. These allow people to make decisions and perform actions, despite the bounded rationality. One relevant aspect of procedural rationality is the ability to carry out ▸ problem-solving processes.	Simon, H. A. (1978). Rationality as process and as product of thought. The American Economic Review 68(2), 1-16.
Reciprocal action	Reciprocal action (reciprocity) requires an interaction between people. People act in a positive, reciprocal manner if they feel that they have been treated fairly and they wish to return the favour. However, they act in a negative, reciprocal manner if they feel that they have been treated unfairly.	Gray, K., Ward, A. F., & Norton, M. I. (2014): Paying it forward: Generalized reciprocity and the limits of generosity. Journal of Experimental Psychology, 143(1), 247.
Satisfication	The term satisfication characterises a heuristic which can be included among ▸ the discrimination heuristics. During the search for possible courses of action, the first one to be found that meets or exceeds the level of aspiration is selected.	Simon, H. A. (1987): Bounded Rationality. In: J. Eatwell et al. (eds.): The New Palgrave Dictionary of Economics. London: Macmillan, 243-245.
Segmentation heuristic	The segmentation heuristic can be included among the ▸ structuring heuristics. It is used in the problem-solving process, during which a very conspicuous overall problem is broken down into clearly-arranged sub-segments, which are then solved step by step.	Newell, A., & Simon, H. A. (1972): Human problem solving. Englewood Cliffs, New York: Prentice-Hall, 74-75.

Behavioural effect	Description	Source
Self-convincing effect	The self-convincing effect describes one's tendency in decision-making situations to follow the argument which is closest to one's own opinion on a subject (even if this opinion is not appropriate).	Evans, J. S. B. (2016): Belief bias in deductive reasoning. In: F. Pohl (ed.): Cognitive illusions: intriguing phenomena in judgement, thinking and memory. Abindgdon, New York: Routledge, 165-169.
Social norm	Social norms define the expectations of members of a group or a society from behavioural patterns, the observance or disregard of which can lead to social integration or exclusion. Here a distinction is made between ▸ descriptive and ▸ injunctive social norms. People consider social norms in their decision-making, depending on their inclination to ▸ conformity or ▸ non-conformity. Social norms develop in the interaction of people.	Fishbein, M., & Ajzen, I. (2011): Predicting and changing behavior: The reasoned action approach. New York, Hove: Psychology Press, 75-128.
Status quo effect	The Status quo effect describes the tendency of people to favour the current state over changes, even if the new state could bring an improvement.	Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991): Anomalies: the endowment effect, loss aversion, and status quo bias. The Journal of Economic Perspectives, 5(1), 193-206.
Structuring heuristics	Structuring heuristics are ▸ heuristics, which can help to structure the search for possible courses of action or bases for decision-making in decision-making or problem-solving process.	Gigerenzer, G., & Brighton, H. (2011): Homo heuristics: why biased minds make better inferences. In: G. Gigerenzer, R. Hertwig & T. Pachur (eds.): Heuristics: The foundations of adaptive behavior. New York [et al.]: Oxford Univ. Press, 2-30.
Sunk costs effect	The sunk costs effect describes the tendency of people not to bring about a necessary change of action in decision-making situations, if extensive expenditures/efforts have already been made before the action was carried out.	Arkes, H. R., & Blumer, C. (1985). The psychology of sunk cost. Organizational Behavior and Human Decision Processes, 35(1), 124-140.

Blank checklist for the development of behavioural instruments – Annex II

Checklist for the development of behaviour-oriented, environmental-economic instruments

1. Problem specification				*Check*
METHODS				
Problem definition				
Target definition				
Target groups				

2. Existing courses of action and decision-making situations				
METHODS				
Existing courses of action				

3. Desired actions, promoting and inhibiting factors				*Check*
METHODS				
Influencing factors:	*Action 1*	*Action 2*	*Action 3*	
Limitations				
Potential				
Motivators				
Diversity				

4. Development of instruments				
METHODS				
Cognition-related instruments				
Interaction-related instruments				
Incentive-related instruments				
Regulatory instruments				

5. Selection of instrument bundles

METHODS			
Are all phases of the decision-making process covered?	*Instrument bundle 1*	*Instrument bundle 2*	*Instrument bundle 3*
Perception			
Situation analysis			
Selection			
Collection of options			
Selection			
Action/Review			

6. Testing of instrument bundles and final selection

METHODS	
Effect of the instrument bundles	
Selection	

7. Application in practice & reviewing the instruments

METHODS	
Effect achieved by the instrument bundle	

8. Communication of success and/or failure

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