Thought to Behaviour (TtB)

An integrative explanation of human behaviour

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Thought to Behaviour (TtB):

An integrative explanation of human behaviour.

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Abstract

This study develops *Thought to Behaviour* as an integrative explanation of non-instinctive, non-reflexive human behaviour. Building on existing research, the theory's main propositions are formed. Subsequently, those propositions are illustrated by examining empirical research.

According to TtB, objects of thought are source initiators of non-instinctive, non-reflexive human behaviour. Ones personal interpretation of the function and consequences of an object of thought is the first derivative of that particular object of thought. Ones subjective attitude towards that personal interpretation is the second derivative of that particular object of thought. Most attitudes are affective, facilitative or assertive. Human behaviour is ultimately determined by the outcome of mutual influence and competition of attitudes that an individual finds relevant directly prior to, or during acting.

TtB offers support to various existing theories explaining human behaviour. TtB also offers a basis to classify various existing intervention techniques in various applied disciplines within

psychology, such as clinical psychology and organisational psychology.

Behaviour change interventions can focus on any stage of the behaviour development process. Most successful seem to be appropriate combinations of techniques, of foci and of delivery modes. In the absence of a proven behaviour change technique for a specific situation, a proposed 10-step procedure could help bring about desired behaviour.

Keywords: human behaviour, Thought to Behaviour (TtB), behavioural change techniques, objects of thought, interpretation, attitude.

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Introduction

The aim of writing this booklet was to answer the question: *What causes non-instinctive, non-reflexive human behaviour?* As a proposition to answer that question, in this booklet, theory of Thought to Behaviour (TtB) is explained, supported by literature review. Additionally, TtB is illustrated by means of existing empirical data, pertaining various behaviour change techniques.

A vast amount of literature explaining human behaviour exists today. The diversity of this literature may seem indicative of lack of consensus and even contradiction with regard to aspects that should lead to such explanation. However, different schools in psychology may have more in common with one another than one tends to realise. For instance, behaviourism and cognitive psychology differ mainly in their primary focus. While behaviourism tends to restrict itself to observable behaviour, much of cognitive psychology relates to unobservable matters (Skinner, 1984). These theories can complement one another, as is evidenced in various effective behaviour change practices, such as cognitive behaviour therapy (Beck, 2011).

Many psychology practices have been tried, tested and proven effective, up to a certain extent. Limitations to the effectiveness of

certain psychology practices do not prove the theories on which they are based wrong. In some cases, they just do not tell the entire story. All practices have a limited applicability range. Rather than contrasting the respective schools from which they derive, one could examine how they fit into one framework and how they can complement, or even reinforce one another. Such a framework might give an overview that helps explain limitations to the effectiveness and applicability of certain practices.

TtB might offer such a framework, covering the essence of most popular theories explaining non-instinctive, non-reflexive human behaviour. As such, it may help to associate, interconnect and explicate various schools of thought by offering additional explanation and filling in gaps. It may also support identification and explanation of certain limitations to the effectiveness of certain intervention techniques in various applied disciplines within psychology, such as clinical psychology and organisational psychology, or occupational psychology.

TtB was first introduced as a conceptual framework for an integrative explanation of human behaviour in a dissertation about the Elementary Model of Organisational Processes (EMOP) (Van Someren, 2014). TtB is based on the following propositions:

(1) All non-instinctive, non-reflexive human behaviour is grounded on a set of objects of thought (OOT) which actors perceive relevant directly prior to, or during behaviour. These objects of thought are the source initiators of non-instinctive, non-reflexive human behaviour.

(2) An individual's personal interpretations of those source initiators are first derivatives of the OOTs.

(3) An individual's personal attitudes towards his or her own interpretation of those source initiators are second derivatives of the pertaining OOTs.

(4) The outcome of mutual influence and competition of various relevant attitudes determines ultimate non-instinctive, non-reflexive human behaviour.

(5) Circumstance and an actor's aptitude determine the outcome of ones behaviour.

(6) Evaluation of behavioural outcome can inspire changes in future behaviour, by serving as feedback to:

    (a) the composition of the set of objects of thought, when placed in a similar situation;

    (b) ones interpretation of certain objects of thought;

    (c) ones attitude towards ones interpretations.

If these propositions are valid, then non-instinctive, non-reflexive human behaviour can be altered by changing:

(1) the composition and/or dominance of objects of thought (OOT) which an individual perceives relevant directly prior to, or during acting;
(2) an individual's personal interpretation of specific objects of thought;
(3) an individual's personal attitude towards his or her own interpretation of specific objects of thought.

Before testing these propositions, I shall explain TtB, building on existing relevant research.

Human Behaviour Development Process

TtB proposes to describe development of non-instinctive, non-reflexive human behaviour as a process initiated by objects of thought (OOT) that an actor deems relevant immediately prior to, or during acting. These OOTs are interpreted and attitudes are adopted towards those interpretations, inciting individuals to certain behaviour. Each of these stages is discussed next.

Objects of thought

Relative to TtB, the word ‘thought’ is regarded broadly, as a mental awareness of internal or external stimuli (e.g. objects, concepts, emotions, hunger, pain). As such, objects of thought, or whatever comes to mind, can be strongly affected by cognitive aspects, such as experience, as well as by non-cognitive aspects, such as ones environment, hormone levels and other biological functions, and exposure to certain chemicals. Such factors can influence ones thinking. This influence can even be so strong that it “crowds out” the influence of other factors (Loewenstein, 1996). An example of this is the influence of a drug addict’s cravings.

Without mental awareness, a stimulus such as hunger may not become an object of thought. This may lead to someone being completely absorbed in a certain activity, such as work, unaware of his or her rumbling stomach and cramping sensations, ‘forgetting’ to eat.

Instinct could be described as inexperienced awareness (absence of learning). Contrary to reflexes, instinct requires brain activity (Lorenz, 1977). However, instinct is not based on experience, as intuition is (Klein, 2003).

Intuitive thinking tends to be gist-based. It is a primitive way of thinking, based on reduced cues from previous exposure to an OOT. Such cues may be from the current OOT, or from OOTs that a subject in some way relates to the current OOT. Based on those cues, a subject quickly and without further thought draws conclusions about an OOTs function and consequences. This is also referred to as priming (Schacter, 1992; Tulving & Schacter, 1990; Neely, 1977).

Unlike intuitive thinking, cognitive thinking consists of conscious reasoning and tends to be based on (search for) evidence. In literature, usually only the upper two concepts of Figure 1, intuition and cognition, are considered to represent (active) thought. They are also referred to as *fast thinking* and *slow thinking*, or *System 1* and *System 2* (Kahneman, 2011). Those types of thinking exists as halves of one spectrum and combinations of both ways of thinking occur. One may

consciously reason one part of an object of thought, while intuitively drawing conclusions about another part of the same object of thought.

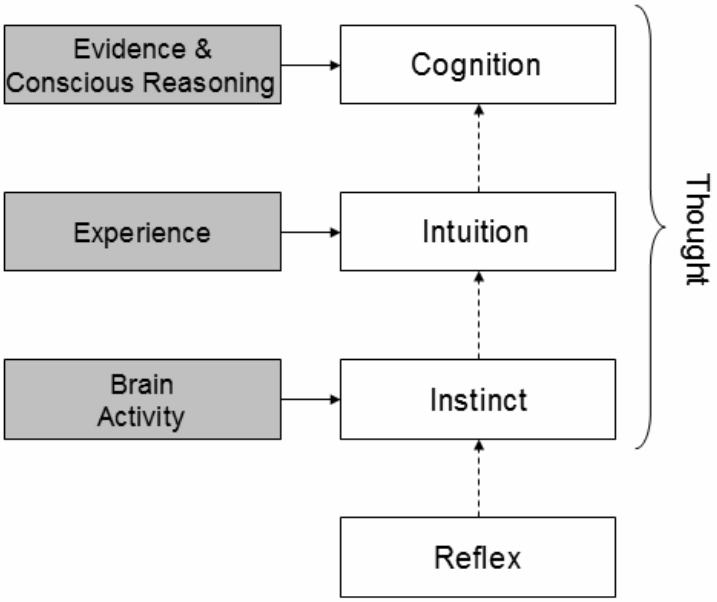

Figure 1: Sliding scale of thought

In Figure 1, instinct is mentioned as a thought process, although there seems to be little consensus about when brain activity becomes actual thought.

Interpretation

The first derivative of each object of thought is guided by mental aptitude, enabling interpretation of the object of thought. In general,

this interpretation is either *allocative* or *authoritative*, respectively serving to determine the *function* of the object of thought or the *consequences* of (not) observing the determined function. For instance, a sign may indicate that a certain patch of grass is allocated as an area one is not to walk on. Ignoring that allocation may elicit a fine from a local authority or being told off by mom.

Interpretations can be affected by some of the same or similar aspects that affect the composition of objects of thought, such as prior experience, hormone levels and other biological functions, and exposure to certain chemicals.

In keeping with the given classification of modes of thought, TtB distinguishes two main types of interpretation: *intuitive interpretation* and *cognitive interpretation*.

The concept of instinctive interpretation seems somehow counterintuitive. In theory, instinctive interpretation relates to objects of thought that one cannot directly link to experience. In practice, interpretation could be sought in experiences that are perceived as similar to the new object of thought. For instance, a baby might attribute the same function and consequence to a comforter as to its mother's breast. On the other hand, a baby sucking on a comforter may be more reflexive than instinctive.

Intuitive interpretation results from either accepting interpretations that are readily accessible in ones mind, or hastily constructing interpretations from readily available mental impressions (Klein, 1988).[1] Accepting interpretations that are readily accessible in ones mind can result from *conditioning*. Conditioning sets out certain interpretations and associations for future occasions which a subject regards applicable to the same OOT as well as to OOTs that the subject perceives as similar. Conditioning is affected by emotions, filtering ones frame of reference, making certain interpretations more readily available than other interpretations.

Cognitive interpretation results from active conscious reasoning based on perceived evidence. As such, cognitive interpretation relates to mental aptitude as well as to frame of reference.

The way in which OOTs, such as information, are presented may strongly affect how they are interpreted. Receptivity of presentation modes can be subjective. For instance, while some find it easier to accurately interpret numeric or diagrammatical data, others are more receptive to natural language (Lipkus, 2007; Bentley et al., 2013).

[1] Recognition primed decision (RPD) model is largely based on (conditioning) intuitive thinking (Klein, 1988)

Attitude

Attitude has long been acknowledged as an antecedent of human behaviour (Thomas & Znaniecki, 1918; Watson, 1924; Allport, 1968). Limited understanding of attitude contributed to measurement techniques, predominantly collecting respondents' expressions. Outcomes of attempts to predict behaviour, based on application of such measurement techniques, raised doubt about an *attitude-behaviour* relationship (Wicker, 1969). Realising that poor outcomes may have been caused by the applied measurement techniques rather than by the basic premise, restored some confidence in attitude contributing to, or leading to human behaviour (Campbell, 1950; Guilford, 1954; Cook & Selltiz, 1964; Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980; Ajzen, 1985, 1991; Fishbein & Ajzen, 2010).

According to TtB, the second derivative of each object of thought is ones attitude towards each personal interpretation of each object of thought, or the extent to which an individual accepts the object of thought to be as he or she has interpreted it (adopted OOT).[2] TtB distinguishes three main domains of attitude, namely: *affection*, *facilitation* and *assertion*, where:

[2] Here, the word 'attitude' refers to attitudes of mind, defined as: "*adopted or habitual mode of regarding the object of thought*" (Oxford English Dictionary, 1969, Vol. I: 553).

- *affection* relates to likes and dislikes with regard to an OOT, as one has interpreted it;
- *facilitation* relates to perceived advantages and disadvantages of the object of thought, as one has interpreted this to be (benefit);
- *assertion* refers to a confidence-building attitude towards ones interpretation of the object of thought, purposed to minimise uncertainty.

Here, assertion relates to adopting an attitude that minimises a subject's insecurity in acting with regard to a certain OOT, as this subject understands it. Assertion often compensates lack of ability to interpret a certain OOT. People tend to search for assertion in social clues, often leading to herd-instinct. Assertion is also obtained from other sources, such as social support structures.

TtB proposes that behaviour is determined by the outcome of mutual influence and competition of various relevant attitudes. This outcome is an adopted pose towards ones interpretation of certain objects of thought.

Figure 2 shows the antecedence of behaviour, from an object of thought, via interpretation of that object of thought, to an attitude towards that interpretation.

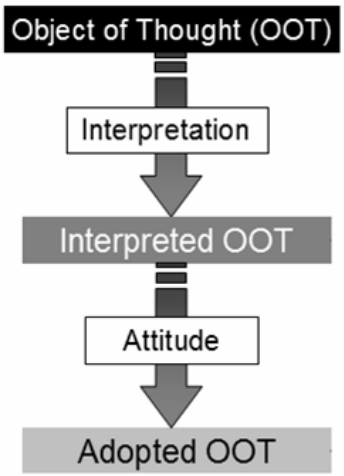

Figure 2: TtB antecedence of behaviour (One tier)

Amplified, this is illustrated in figure 3.

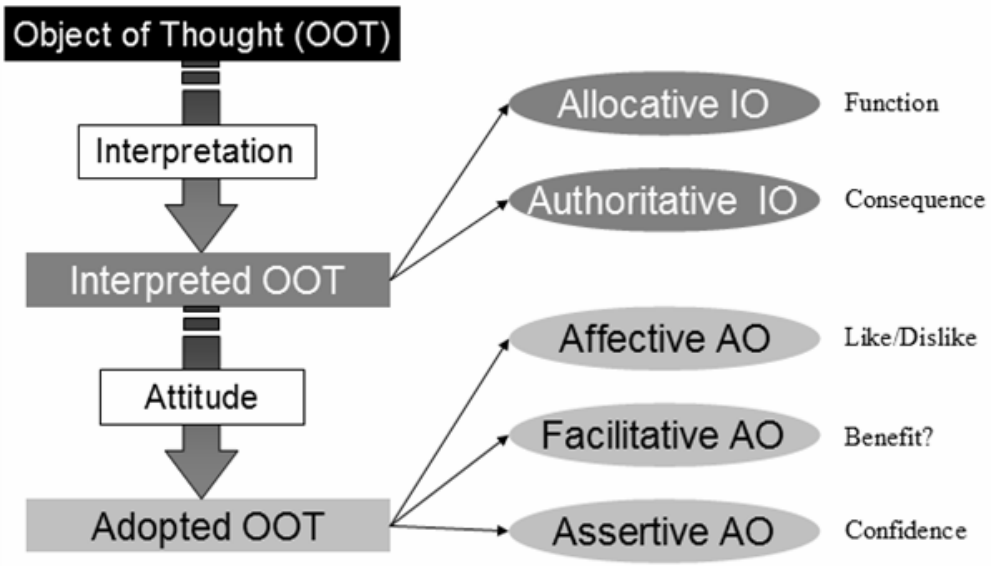

Figure 3: Amplified TtB antecedence of behaviour (One tier)

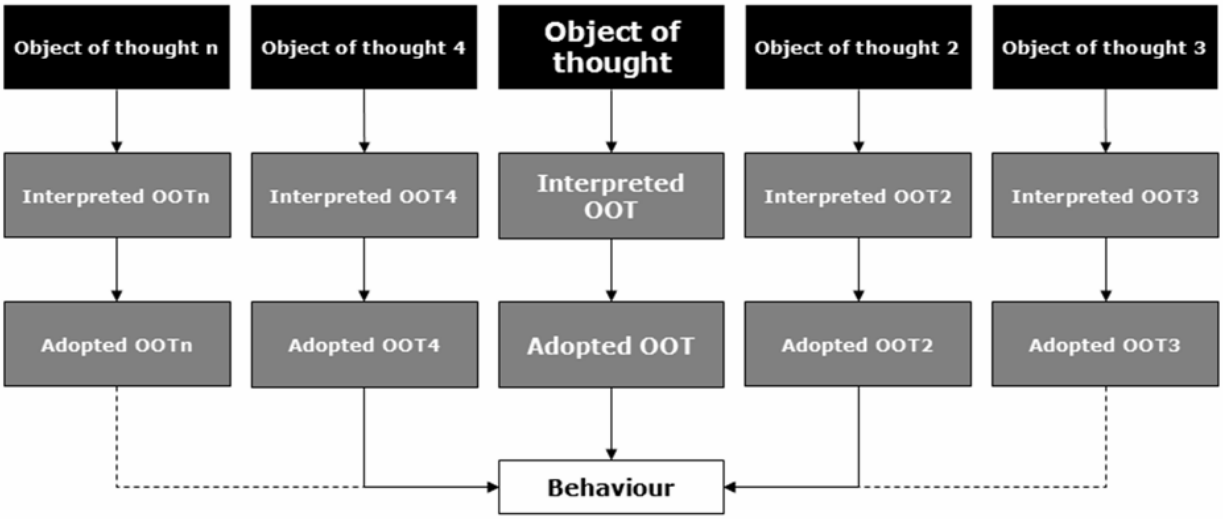

Figure 4: Multi-tier TtB

Usually, more than one object of thought serves as source initiator of non-instinctive human behaviour. The outcome of mutual influence and competition for dominance of various relevant attitudes determines ultimate behaviour (Figure 4). For instance, a person may have adopted an attitude of positive affect towards object of thought 1, which dominates other adoptions towards his or her understanding of the pertaining object of thought. This attitude will only determine behaviour when it is stronger than all other attitudes towards all objects of thought that the individual deems important at that time.

The extent to which an actor is enabled or restricted in acting by ones environment or by (actual limitations to) ones own abilities helps determine the *outcome* of this behaviour. It will not affect behaviour itself unless these aspects were objects of thought, contributing to initiating the pertaining behaviour.

Aptitudes and attitudes are not constants; they develop and deteriorate. Consequently, behaviour can be initiated by various objects of thought and the same objects of thought can be interpreted differently over time (Dweck, 2012). Attitudes towards certain interpretations can also change and differ from time to time.

Objects of thought, interpretations and attitudes can be affected strongly and suddenly by aspects, such as *circumstance*, *emotions* and *mood*, potentially affecting behaviour. For instance, emotions and environmental changes can alter what comes to mind, they can cause individuals to change their interpretation of certain objects of thought, and they can cause attitudinal changes, even when underlying objects of thought and interpretations remain unchanged.

Attitudes help determine whether *objects of thought* become *objects of interest*. Adding information may add or enrich objects of thought, stimulating changes in interpreting the objects. New attitudes may be adopted towards this new understanding, ultimately leading to different behaviour. An individual may be unwilling to understand a certain matter due to limited interest or to negative sentiments with regard to a certain object of thought. Additional information about this object of thought could lead to better and more understanding of the pertaining object of thought. This individual may even adopt more positive sentiments towards his or her new understanding of this object of thought, for instance as something worth knowing more about (facilitation).

Mental aptitude primarily relates to questions such as: *What do I know*, *what can I do*, and *what can I learn*? Attitude relates more to the question: *How am I?* How humans are, is strongly linked to what they know and to what they can do. The characteristic way in which individuals process aptitudes into attitudes and subsequently into behaviour, relates to the question: *Who am I*? People can change their attitudes and their ways in consequence to changes in their abilities and in how they interpret things. However, this does not mean that we can change *who* people are.

Behaviour and learning

It is widely believed that mental constructs or mental processes such as thought (Ellis, 1957), information processing (Neisser, 1967), beliefs (Ajzen, 1985, 1991) or learned knowledge (James, 1983) guide or determine human behaviour. Some contend that behaviour is guided by learning consisting of gradual modification of simpler behaviours, imitated from others and reinforced by gratification (rewards) promoting repetition of exhibited behaviour (Watson, 1924; Miller & Dollard, 1941; Skinner, 1953; Bandura, 1986). Differential association theory (Sutherland, 1924), related to criminal behaviour, proposes that deviant behaviour is learned behaviour. One could argue that this is not necessarily so. Even though deviant behaviour can derive from thorough consideration, as all behaviour, it is mainly

determined by ones attitudes (affect, facilitation, assertion) towards ones own understanding of function and consequences of certain OOTs. Therefore, much criminal behaviour seems to be incited by experiencing *or expecting* a liking or benefit from the consequences of certain criminal acts. Such benefit can consist of financial rewards, peer recognition or other perceived rewards.

In part, learning results from evaluating behavioural outcomes. This may relate to both apparent and imperceptible behaviour, such as remembering a word or recognising a sound. Perceived behavioural control is an interpretation of ones personal abilities. By exerting the pertaining behaviour, actual behavioural control is experienced. Evaluating and understanding actual behavioural control in comparison with earlier perceived behavioural control is an example of a learning process.

Figure 5 illustrates that behaviour is affected by learning in the sense of acquiring new knowledge from feedback of behavioural outcomes to objects of thought, to interpretation and to adopting attitude. This counters suggestions of humans having a *predetermined* behavioural range. Since all beings have limited intellect, mental aptitude is a delimiter to learning. Therefore, it seems valid to assume that all beings do have a *predisposed* behavioural range.

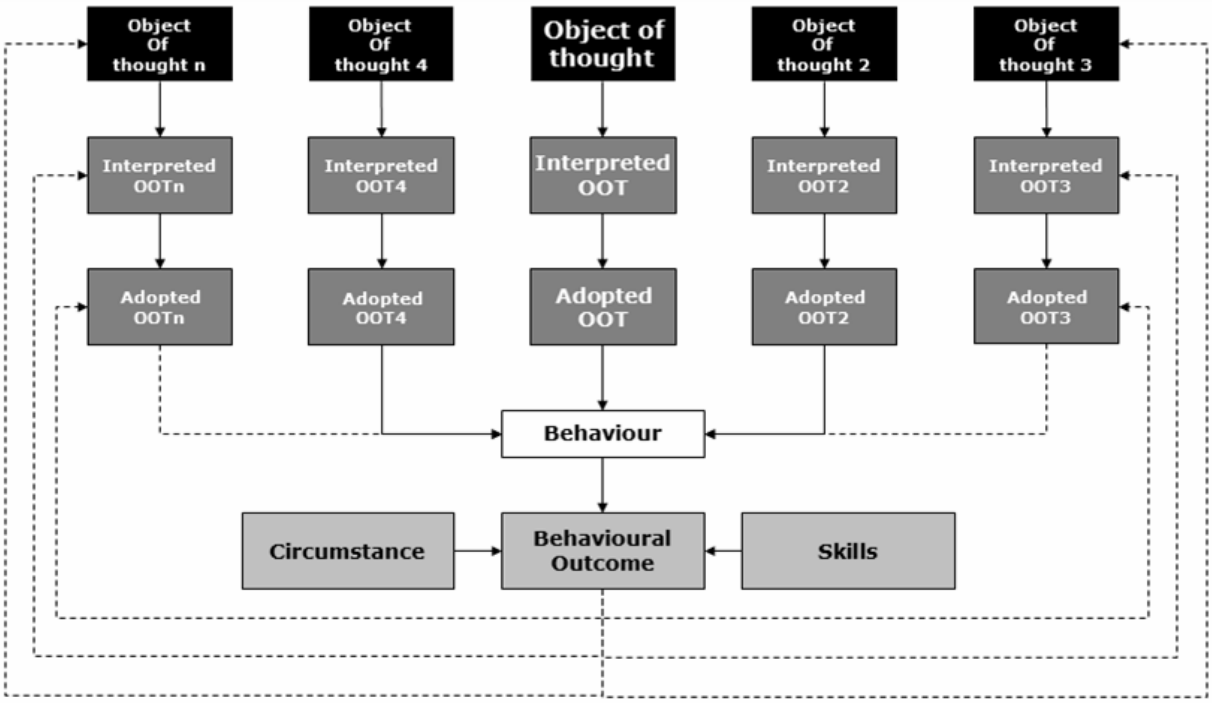

Figure 5: Multi-tier TtB with feedback from behavioural outcome

Attitude and behaviour

Theories to predict human behaviour seem all somehow, directly or indirectly, based on previous behaviour, pre-existing attitudes or pre-existing behaviour intentions.[3] Such thinking has an important downside: even though certain attitudes can be adopted repeatedly, or habitually, even to the degree of seeming permanent, attitudes affecting (or determining) behaviour are dynamic and can even be

[3] Past behaviour is apparently a better predictor of future behaviour than intentions are (Den Ouden, 1995). This seems to suggest that attitudes relate more to past behaviour (experience) than they do to intended behaviour.

transient or momentary. Since an individual can alter his or her attitude towards certain interpretations and interpretations of other objects of thought can change, such predictions tend to be unreliable.

Contrary to many assertions in literature, attitudes cannot be measured. Measurement suggests accuracy, objectivity and replicability. Attitudes are volatile or habitual modes of regarding an object of thought, which cannot be measured with any instrument existing today. Attitudes can be inferred, for instance by query, such as using the Elementary Model Questionnaire (EMQ) (Van Someren, 2014). At best, such queries yield subjective indicators of certain attitudes, existing during querying. Such indicators could possibly be objectified to a certain extent by triangulation. While perceptions can be regarded as interpretations of experiences, self-report inferences not necessarily yields report of perceptions that respondents have, rather than perceptions *they wish to convey*. This could reflect their attitudes towards those perceptions. Those, at times momentary, attitudes may differ from their actual perceptions, influenced, for instance, by emotions or mood, such as envy, anger, affection or pity.

TtB and CBT

Much of TtB falls within the realm of cognitive psychology. To some, the term *Thought to Behaviour* might call to mind Cognitive Behaviour Therapy (CBT). Most of CBT seems to fit well in the TtB framework, as do the core theories from which CBT is derived. However, there are several distinct particulars. Contrary to CBT, and perhaps even contrary to what the term TtB may seem to suggest, TtB does not directly link humans' thoughts to their behaviour. The main line of thought behind CBT is that ones behaviour is a direct result of ones thinking and that undesired behaviour results from distorted thinking (Field, Beeson & Jones, 2015). Conversely, TtB proposes that behaviour results from:

- What one thinks (objects of thought);
- How objects of thought are interpreted;
- What attitude one adopts towards ones own interpretations;
- Which attitudes dominate relative to all other attitudes.

The effectiveness of certain CBT practices, combined with the realisation that behaviour cannot be explained by thinking alone, have possibly driven CBT to develop over time. With initial focus mainly on (environing) behavioural factors, more emphasis was later placed

on cognitive factors, before also expressly taking context into account (Hayes, Villatte, Levin & Hildebrandt, 2011). Especially with this latter, ‘third wave’, TtB and (contextual) CBT have grown much closer together. Any distance that might remain might perhaps be bridged by a more universal approach of CBT, and realisation and acknowledgement of the importance of both interpretation and attitudes on human behaviour. I am not yet certain whether this should give rise to a fourth CBT wave, which could perhaps be referred to as ACBT, or Attitudinal Cognitive Behaviour Therapy.

Comparative considerations

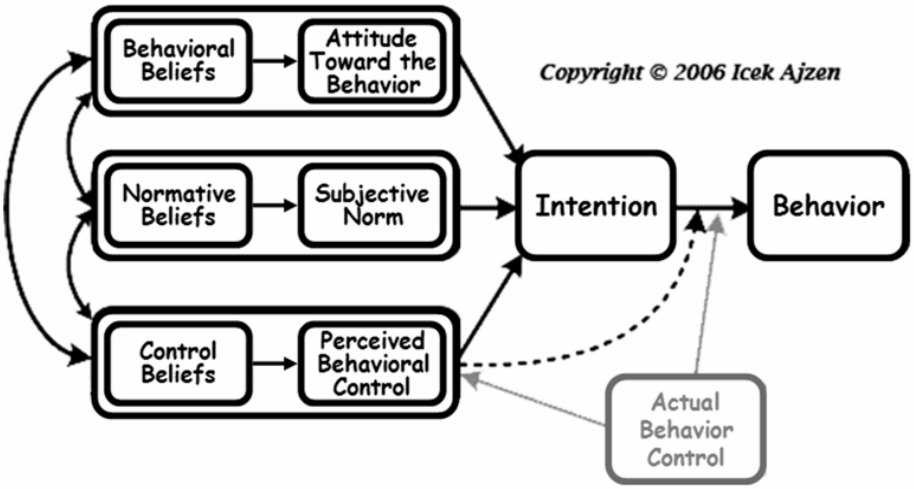

Figure 6: Theory of Planned Behaviour. Reprinted with permission from http://people.umass.edu/aizen/tpb.diag.html by I. Ajzen (Ajzen, 1985, 1991)

With their *Theory of Reasoned Action*, Fishbein and Ajzen (1975, 1980) proposed that actual behaviour is preceded by an intention to behave a certain way and that behaviour intention is determined by *attitudes* and *subjective norms*. Iceck Ajzen extended this in his *Theory of Planned Behaviour* (Ajzen, 1985, 1991) by including perceived behavioural control, parallel to attitude and subjective norms as antecedents of behaviour intention, thus linking belief and behaviour. Fishbein and Ajzen also suggested that *actual behaviour*

control directly affects behaviour (Fishbein & Ajzen, 2010). All these aspects are brought together in figure 6.

According to TtB, intentions, beliefs and perceptions are all conscious mental constructs, affected by mental aptitude. As objects of thought, they can all indirectly initiate behaviour. The objects of thought that an actor deems relevant during, or directly prior to acting, are interpreted by establishing their function and the consequences of (not observing) that function. Subsequently, the actor adopts attitudes towards those interpretations and establishes an order of personal importance of those attitudes. Finally, attitudes influence one another and the most dominant attitudes determine how the actor shall behave. This entire process can take place within a split second or longer, depending on the type of thought the actor has exerted (fast or slow).

For instance, a subject may intend to eat less candy and to resist temptations to eat candy. As such, intentions are objects of thought. Once the subject has access to candy, it is not the intentions that determine behaviour, but the individual's momentary attitude towards his or her personal interpretation of those intentions. That attitude will interact and compete with multiple attitudes towards various personal interpretations (Köhler, 1929; Wertheimer, 1920, 1922, Koffka, 1921, 1922). Actual behaviour is determined by momentary attitudinal domination.

According to TtB, perceived behavioural control contributes to determining human behaviour as an interpretation of ones personal abilities, relative to certain behaviour. Ones personal attitude towards that interpretation will, along with other attitudes that an actor deems important at that time, determine the actor's behaviour. Circumstance and actual behaviour control (skill, or aptitude) affect the outcome of that behaviour. Evaluation of the outcome of this behaviour may lead to associating other objects of thought to the pertaining behaviour in the future, or to disassociating earlier associated objects of thought. Behavioural outcome also serves to evaluate ones earlier interpretation of ones personal abilities, possibly affecting future attitudes, subsequently affecting future behaviour. Consequently, skill does not directly affect behaviour. Skill, or actual behaviour control, affects behavioural outcome, the evaluation of which is included in future selection of objects of thought, interpretation and attitude adoption of the objects of thought that an actor deems relevant then, thus indirectly affecting *future* behaviour. For instance, actual behaviour control does not determine whether a boy tries to jump across a ditch. Instead, it determines behavioural outcome (will the boy make it across the ditch?).

An individual's decision to behave a certain way is not merely based on the expected outcomes of certain behaviour. Even when behaving voluntary, an individual may not hold expectations about outcomes or consequences of his or her behaviour. This is clearly noticeable in experimental behaviour, for instance by toddlers pressing buttons,

manipulating objects, or experimental behaviour at any other stage in life.

Subjective norms affect behaviour similar to how intention does, since behaviour is also determined by its second derivative, being ones personal attitude towards ones own interpretation of social norms that one perceives relevant. TtB acknowledges that self-efficacy potentially contributes significantly to determining behaviour (Bandura, 1977; Fishbein & Capella, 2006). *Self-efficacy* is part of *self-concept* and as such, it is a first derivative of the object of thought *personal qualities*. It is an individual's personal interpretation of his or her own physical and mental powers. From this first derivative, *self-esteem* derives as an adopted attitude, or a subjective pose towards ones own interpretation of his or her own physical and mental powers. Self-esteem relates to all main domains of attitude: liking oneself (affection), belief in ones abilities (facilitation) and social confidence (assertion). This attitude influences and competes with other relevant attitudes, the outcome of which determines behaviour at a certain moment.

With their transtheoretical model, Prochaska and DiClemente (1982) identified 10 processes of change, namely:

(1) Consciousness raising (information gathering);
(2) Self-liberation (trying to convince oneself of ones ability to change);

(3) Social liberation (searching for social clues to aid the intended change);
(4) Self re-evaluation (asking oneself: how do I feel about my current behaviour?);
(5) Environmental re-evaluation (questioning: does my current behaviour affect the environment?);
(6) Counter conditioning (shifting focus / seeking distraction to prevent unwanted behaviour);
(7) Stimulus control (removing reminders that trigger undesired behaviour);
(8) Reinforcement management (others rewarding ones desired behaviour);
(9) Dramatic relief (prevent confrontation with potential consequences of unwanted behaviour);
(10) Helping relationships (being in contact with people who support the intended change).

We can categorise these items in TtB as follows:

- *Objects of Thought* (Counter conditioning, Stimulus control, Helping relationships);
- *Interpretation* (Consciousness raising [function and consequence], Self-liberation [consequence], Environmental re-evaluation [consequence], Helping relationships [function and consequence]);
- *Attitudes* (Social liberation [assertive], Self re-evaluation [affective], Reinforcement management [affective, assertive],

Dramatic relief [facilitative], Helping relationships [affective, assertive, facilitative]);

Verbruggen, McLaren and Chambers conducted a literature study on human self-control. Referring mainly to literature related to neuroscience, cognitive science and psychology, the outcome of this study led them to propose a mechanistic basis for the executive control of actions that appears to fit well within TtB (Verbruggen, McLaren & Chambers, 2014). According to those authors, at the most basic level, action control depends on three cognitive processes. They named their first process *signal detection*, during which signals become objects of thoughts, which a subject interprets. During the second process (*action selection*), further interpretation takes place, attitudes are adopted and attitude dominance is determined, guiding the subject's behaviour. Their third process (*action execution*) consists of behaving as the preceding processes have incited to do. These authors also recognise that these processes are affected by experience, evaluation of earlier outcomes of the same or similar behaviour.

TtB schematically

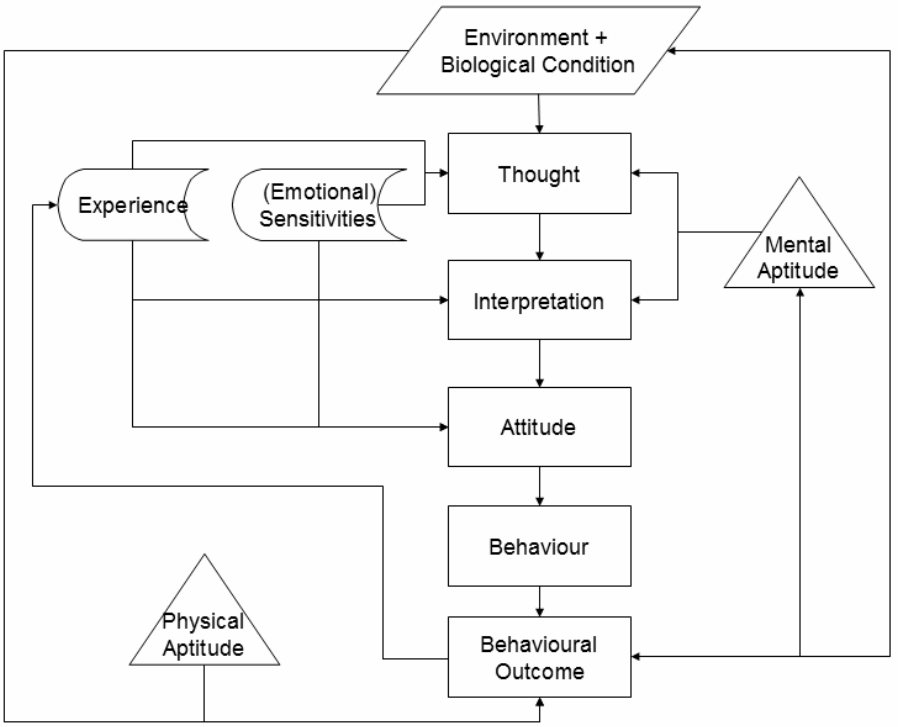

Figure 7: Basic TtB schema

Figure 7 roughly illustrates different aspects of TtB. Firstly, an individual's environment, along with his or her biological condition, mental aptitude, personal experience and emotional sensitivities, bring certain thoughts to someone's mind. Interpretation is obviously affected by ones mental aptitude. Experience affects interpretation of those thoughts, for instance as mental representations that are easily accessible for intuitive interpretation. Emotional sensitivities also affect interpretation, for instance by selecting or filtering interpretation venues. Attitude is affected by experience, resulting in

habitually adopting earlier attitudes in the same or similar situations, but also in breaking such traditions after a recent exceptional experience. Emotional sensitivities can cause one to adopt different attitudes in situations that differ only by ones state of mind. Emotional sensitivities also help determine momentary domination of attitudes, ultimately determining an individual's behaviour. Behavioural outcome is mediated by circumstance, as well as by ones relevant skills. This outcome is experienced by the pertaining individual. Behavioural outcome also affects, or becomes part of that individual's environment as metaphorical or actual footprints.

Next, the propositions on which TtB are based shall be illustrated by examining existing empirical evidence.

Empirical perspective

The vast interest in human behaviour has rendered an abundance of empirical data to test various theories against. Some evidence we can find by observing our own surroundings. For instance, from observing neonates and individuals with mental defects we can find that, as beings are less capable of thought, their behaviour becomes less diverse and more predictable. This seems to support the supposition that objects of thought are source initiators of non-instinctive, non-reflexive behaviour.

Even though the focus of this booklet is mainly on non-instinctive behaviour, one could argue that instinctive behaviour is also governed by a similar process, perhaps more related to physical awareness than to mental awareness. For instance, in neonates, awareness of hunger has function (signal to feed) and relates to consequences of (non-observance of) that function (starvation). One might assume that their attitude towards that physical awareness determines whether a hungry baby cries. On the other hand, a hungry infant that does not cry may not be aware of its need to eat (Choonara, 1999, van Manen, 2016). Further research seems required to expand our understanding of instinctive behaviour.

Methods aimed at changing human behaviour can be categorised by their focus on:

(1) Behaviour itself;
(2) Attitudes leading to behaviour;
(3) Interpretation of objects of thought, from which attitudes are derived;
(4) Objects of thought that serve as source initiators of certain behaviour;
(5) A combination of 1 - 4.

Various modes exist to deliver behaviour change techniques. On one side of the spectrum we find modes such as intensive family intervention models, addressing entire families of delinquent and substance-abusing adolescents in sessions held in clinics and home settings, and optionally also in schools, mental health agencies, child welfare agencies, probation and parole offices, and aftercare systems (Alexander, 2013). On the other side of the spectrum, we find modes such as text messaging to guide behaviour change for disease management and prevention (Cole-Lewis & Kershaw, 2010). Somewhere in between we find delivery modes, such as 'CanChange', which is a telephone-delivered multiple health behaviour change intervention aimed at colorectal cancer survivors (Hawkes et al., 2013). There is also increasing interest in information systems to support behaviour change via the Internet (Drozd, Lehto & Oinas-Kukkonen, 2012).

Changing behaviour

To some, changing (habitual) behaviour might seem merely a matter of using willpower. Examples are a mother telling her child to stop picking its nose, or someone who decides to quit smoking, to eat healthier food or exercise more.

In 2015, a comprehensive study of literature dating from 2000 until 2015 was conducted on self-regulation mediators of lifestyle obesity interventions involving behaviour and weight change (Teixeira et al., 2015). This study showed little evidence that such interventions are successful. However, relatively high autonomous motivation, self-efficacy, and self-regulation skills did seem to function as mediators in such interventions, leading to more beneficial weight and increased physical activity.

On closer examination, willing one into new behaviour appears less straightforward than that. Prochaska and DiClemente studied the process of people who tried to quit smoking by themselves, using 872 research subjects (Prochaska & DiClemente, 1983). These researchers found that self-changers:

- Deliberately gather information about their smoking habits before trying to quit (*OOT, interpretation*);

- Both prior to trying to quit and during that process repeatedly ask themselves: how do I feel about my current behaviour? (*attitude*);
- While trying to quit, search for social clues (*interpretation, assertion*), remain in contact with people who support the intended change (*OOT, interpretations, attitudes*), and draw from others who reward their efforts in trying to quit (*attitudes*);
- Try to shift their focus or seek distraction to help them quit smoking and to prevent them from reverting to smoking (*OOT*).

Obviously, to someone who deliberately gathers information about his or her own smoking habits, that subject is a prominent object of thought. This example illustrates that the entire TtB behaviour development process, from objects of thought, via interpretations to attitudes are drawn on to change behaviour, even when one may seemingly only apply willpower to achieve this.

Changing attitudes

Changing behaviour by means of changing attitudes focuses on the three main domains of attitude:

- Affection (Liking/Disliking)
- Facilitation (Benefit/Detriment)
- Assertion (Social confidence)

Examples of those domains are, respectively:

- familiarising children with animals, to prevent animal cruelty;
- (financially) rewarding certain behaviour; giving praise;
- lessons in etiquette (this is how we do things); professionalising;

Brian Wansink, a professor at Cornell University (2015), found that effectively changing ones nutrition habits from insalubrious to salubrious tends to result from making healthy food choices

- comparatively or absolutely more attractive;
- physically or cognitively more convenient;
- seemingly or actually more normal.

These three focal points perfectly match the three main domains of attitude: *affection, facilitation* and *assertion*.

Emphasis can also be on one attitude domain, such as on assertion. For example, a survey of 1,788 women in Pakistan showed that a woman's intention to use contraceptive methods was most strongly determined by her understanding of whether or not her in-laws support family planning (Agha, 2010). Another example: when one partner of a married or cohabiting couple makes a positive health behaviour change, the other partner is more likely to also make a positive health behaviour change (Jackson, Steptoe, Wardle, 2015).

Changing interpretations

This behaviour approach is not to be mistaken by learning to improve behavioural outcomes, such as athletic achievements, rather than learning with the purpose to change behaviour. For example, whether people with Parkinson's disease or multiple sclerosis engage in exercise and physical activity is determined largely by how they interpret their own abilities, the consequences of their actions and the function and consequences of certain goals and facilitators (Terry & Motl, 2013). Changing those interpretations will also lead to changes in the extent to which they engage in exercise and physical activity.

Semi-structured interviews of 61 patients who underwent angioplasty showed that interpretation played an important role in those who had not been successful at post-angioplasty multi-behaviour change. This

relates mainly to interpreting angioplasty as a cure of heart disease, rendering behaviour change unnecessary, and to interpreting such behaviour change as having no (beneficial) consequence (Peterson et al. 2009).

A common behaviour change technique is to prompt interpretations to a subject before this subject has interpreted the OOT, or to overrule existing interpretations. Related to this is the technique of framing interpretations by which OOTs are presented in a way that tends to lead recipients to interpret them a certain way (Tversky & Kahneman, 1981). Desired behaviour and undesired behaviour may be presented as OOTs. Positive interpretations of the desired behaviour (mainly in terms of consequences) are then compared to disadvantageous interpretations of the undesired behaviour (Keller, 2011). The aim of this technique is to incite adoption of an attitude that favours the desired behaviour. Those who use this technique for behaviour control, rather than for behaviour change, often capitalise on people's loss aversion (Thaler & Sunstein, 2008; Park, Jun, & MacInnis, 2000; Samuelson & Zeckhauser, 1988). However, Gallagher and Updegraff (2012) suggest that gain-framed messages are more effective than loss-framed messages in encouraging illness prevention behaviours in general, and smoking cessation, skin cancer prevention and physical activity behaviour in particular (Gallagher & Updegraff, 2012).

Changing objects of thoughts

A common method to attempt to control or change human behaviour is to control or manipulate an individual's objects of thought. This form of stimulus control is approached in three ways:

(1) Eliminate undesirable thoughts;
(2) Add desirable thoughts;
(3) Emphasise desirable thoughts while pushing other thoughts into the background.

By eradicating or devaluating objects of thought that initiate undesired behaviour, chances are decreased that ones attitudes towards ones personal interpretations of those OOTs determine behaviour. By promoting objects of thought that initiate desired behaviour, chances increase that ones attitudes towards ones personal interpretations of those OOTs determine behaviour.

Many OOTs are presented by ones environment. Events come to mind more often as exposure to them increases. This can take place in various ways, such as through education, via the media, symbols, and slogans or by means of personal experience. The decline in HIV incidence in Zimbabwe since the late 1990's is largely attributed to high personal exposure to AIDS mortality and better understanding of how HIV can be contracted (Muchini et al., 2011).

To individuals who have a new healthy partner, living a healthier lifestyle is a more prominent object of thought than to those who have a consistently healthy partner. Consequently, those who have a new healthy partner are more likely to better their behaviour with regard to smoking and physical activity, than those who have a consistently healthy partner (Jackson, Steptoe, Wardle, 2015).

An intensive field experiment (N = 4,345) in California showed that towel reuse in hotels increased due to repeatedly bringing the hotel management's wish for guests to do so to the attention of guests, verbally and using symbolism (Brown, Gneezy, Keenan, Baca-Motes & Nelson, 2013). These results are probably not merely due to manipulating hotel guests' OOTs, but also to their personal attitudes towards their own interpretation of these request. The belief that most other hotel guests comply with the hotel's request probably urged them to do as they believe others do.

The 12-Step model, aimed to achieve and maintain abstinence from substance abuse, is a good example of minimising objects of thought to those that may be conducive to desired behaviour (Wilson, 1938). Characteristic for the 12-step model are the dominating thought of a greater power as an inspiration, combined with a peer-based social support system.

Integral behaviour change approach

Appropriately addressing more than one stage of the behaviour development process may increase success of behaviour change interventions. Epton, Harris, Kane, van Koningsbruggen and Sheeran (2014) suggest that boosting a subject's self-esteem has positive effects on such a subject's:

- willingness to accept certain interpretation suggestions;
- adoption of attitudes that are conducive to the intended behaviour change;
- actual behaviour change.

Applying multiple behaviour change techniques often implies addressing multiple stages of the TtB behaviour development process, and a wider range of objects of thought. Based on research on 85 studies, a team of researchers concluded that behaviour change interventions tended to be more successful when they are intensive in nature and incorporate multiple behaviour change techniques and modes of delivery (Webb, Joseph, Yardley & Michie, 2010). Another examination of 15 studies, published between 1998 and 2010, showed similar results (Hendrie et al. 2011). One example of applying multiple behaviour change techniques is the Functional Family Therapy (FFT). This is a short-term, structured, strength-based, intensive family intervention model for delinquent and substance-

using adolescents that holistically addresses the entire family system (Alexander, 2013).

Parents are generally better positioned than anyone else to affect and determine to which stimuli their children are exposed, how those are interpreted, which attitudes are adopted and which behaviour results from such processes. Interventions in children's behaviour, for instance those with emotional and behavioural problems, are relatively successful when those children's parents are actively engaged in such interventions (Olin et al., 2010).

Successful application of Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 1999; Hayes, Pistorello & Levin, 2012), is likely due to focus on multiple stages of the TtB behaviour development process. ACT focuses on the following six processes:

(1) Acceptance: This consists on the one hand of filtering out unwanted stimuli (OOTs that may initiate undesired behaviour). On the other hand, it consists of focus on OOTs that are likely to initiate desired behaviour.
(2) Defusion: Guiding ones interpretations of certain OOTs in terms of their function and (potential) consequences.
(3) Self: Interpreting ones personal qualities such that it leads to a self-concept that invites adoption of attitudes that incite desired behaviour.

(4) Now: Focus on OOTs related to the present, instead of to the past or future.
(5) Values: Interpreting the intended behaviour change (OOT) as something that supports aspects that one holds dear.
(6) Action: Controlling and evaluating behaviour.

Gamification is an integral behaviour change approach that focuses on specific OOTs, priming interpretations of those OOTs and inciting attitudes towards those interpretations that are conducive to triggering certain desired behaviour, for instance aimed at health improvement (Thompson, 2012) or preventing relationship violence (Schoech, 2013). Such games force players to think about certain subjects, educate them on their function, as well as on their consequences and make it fun and rewarding to adopt certain attitudes and behave a certain way (Orji, Vassileva, Mandryk, 2012). Successful games prompt players to carry through these attitudes and behaviours outside the game, in real life.

Conclusion and discussion

TtB is proposed to be an integrative explanation of human behaviour. As such, it should be compatible with, or encompass a wide range of other psychology theories. This study supports the supposition that non-instinctive, non-reflexive human behaviour can be altered by changing one or more of the following:

(1) the composition and/or dominance of objects of thought (OOT) which the actor perceives relevant directly prior to, or during behaviour;
(2) an individual's personal interpretation of specific objects of thought;
(3) an individual's personal attitude towards his or her own interpretation of specific objects of thought.

Most commonly applied behaviour change techniques seem to fit well with TtB. This ranges from seeking distraction to resist the urge to smoke (main supposition 1) to boosting ones self-esteem by evaluating ones earlier, successful attempt to change ones behaviour (main supposition 6).

The behaviour development process consists of four stages:

(1) Formation of Objects of Thought (OOT);
(2) Interpretation of Objects of Thought;
(3) Adopting attitudes towards ones Objects of Thought, as one has interpreted them, and establishing dominance amongst adopted attitudes;
(4) Behaving as incited by dominating attitudes.

Unless they are OOTs immediately prior to, or during acting, circumstance and personal aptitude do not affect an individual's behaviour. Circumstance and personal aptitude are important in determining behavioural outcome. Information obtained from evaluating behavioural outcome can affect each of the behaviour development process stages in the future. Acknowledging this can help prevent placing undue or misdirected emphasis on aspects that have a different role within behaviour development than attributed earlier, such as behaviour intentions.

Corresponding with the behaviour development process stages, human behaviour intervention techniques can be roughly categorised by means of their primary focus area:

(1) Objects of thought
(2) Interpretation (cognition)
(3) Attitude (affect, benefit, confidence)
(4) Behaviour
(5) Multiple phased interventions

Even when multiple individuals are diagnosed with the same affliction and the same goals have been set for each, the same intervention techniques may not be equally effective in all subjects. This is because each individual differs from any other in terms of mental aptitude, experience, emotional tendencies, and (attitudinal) characteristics. Furthermore, their conditions and environments may differ and vary. Consequently, one individual may be more receptive to a certain intervention technique than another may be, even when many major aspects may seem equal.

Successful change interventions can be made at any stage of the behaviour development process. Suitability of certain techniques and focus on specific stages depend heavily on pertaining behavioural change goals and existing conditions. Often, appropriate combinations of techniques and foci are very successful.

Human beings can behave *out of character*. Any change in ones objects of thought, interpretations or attitudes can trigger behaviour that an actor has not performed earlier. Interpretation can be affected by aspects, such as learning or forgetting and attitudes can be volatile. An individual may habitually adopt the same attitude relative to a certain object of thought, even to the extent of that attitude seeming permanent. When this occurs, others may find that attitude a characterising feature of the pertaining individual. However, each time attitudes are adopted anew directly prior to, or during acting. Attitudes can even be influenced biologically or chemically, for instance by

addictive or habituating drugs or food products. Consequently, a capable individual may have behaved consistently a certain way, under certain conditions for many times. This individual may behave very differently a next time. Past behaviour is no guarantee for future behaviour. Therefore, behaviour prediction directly or indirectly based on past behaviour does not yield certain outcomes.

Objects of thought, or whatever comes to mind, are largely determined by ones environment, physical condition, history, mental aptitude, emotional sensitivities and ones attitudes. How one interprets certain matters depends largely on ones mental aptitude, aided and guided by experience, mediated by emotions and mood. Ones interpretations, ones perceptions of prior experience and earlier adopted attitudes are main aspects in the formation of attitudes. Consequently, one could state that the range within which human behaviour tends to take place is determined by ones environment, constitution, aptitude, history and character. Unpredictability of these variables increases, as the forecast period is longer. Consequently, behaviour prediction becomes more unreliable as forecasts relate to longer periods. Sudden, fundamental changes, such as physical hormonal or chemical imbalance, or environmental changes, such as a physical attack or threat of war, can instantly affect each stage of behaviour development: formation and interpretation of objects of thought, adopting attitudes towards those objects of thought, ultimately leading to behaving in a way one has never done before.

10-step TtB-based behaviour change approach

As mentioned earlier in this booklet, behaviour change techniques (BCTs) can focus on any stage of the behaviour change process. When an ideal BCT has not yet been found, one could apply the following 10-step procedure to bring about desired behaviour.

(1) Elicit the objects of thought; find out which may incite (un)desired behaviour and which may prevent (un)desired behaviour, and determine their dominance order;
(2) Elicit how relevant objects of thought are interpreted;
(3) Elicit the (environmental, cultural, educational, mental, introspective …) stimuli of objects of thought;
(4) Elicit attitudes towards dominant objects of thought;
(5) Elicit dominating attitudes, relative to behaviour;
(6) Address the stimuli of the dominating objects of thought, e.g. change environment, cultural interpretation, education, et cet., with focus on OOTs that are expected to initiate desired behaviour;
(7) Guide interpretations of (renewed) objects of thought;
(8) Guide attitudes towards new/renewed objects of thought;
(9) Observe and evaluate new behaviour;
(10) If unsatisfied, as well as for maintenance, start anew at 1.

Steps 1 – 5 could be taken in open interviews, without feeding subjects objects of thought, or priming or framing interpretations. Much information can be gathered by asking what, how and why questions, registering answers and analysing and categorising the information after completing an interview.

The method to select for addressing the stimuli of the dominating objects of thought depends on the nature of the pertaining objects of thought. For instance:

- if a dominating OOT is brought about by (lacking) certain knowledge, then learning theories, social cognitive theories and so on, could be applied;
- If ones self-image is a dominating OOT, then addressing self-efficacy might be appropriate;
- If behavioural consequences are not dominating OOTs, then this should be addressed to promote consciousness in the pertaining individual.

As can be seen from the last bullet, focus may not only be on dominating OOTs, but also on absent OOTs that should be more prominent or the second derivative of which should even dominate ones attitudes, ultimately determining a subject's behaviour.

During this 10-step approach, there is relatively little direct focus on the behaviour one wishes to change. This is because behaviour is regarded as a consequence, an output of the TtB-process.

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