

Stage-based theories of behaviour change

Ron Borland PhD
The Cancer Council Victoria



TransTheoretical Model (TTM)

Stages of change

- **Pre-contemplation:** No intention to act within 6 months
- **Contemplation:** Intends to act within 6 months.
- **Preparation:** Intends to act within 30 days and behavioural steps already taken
- **Action:** Overt action for less than 6 months
- **Maintenance:** Change maintained over 6 months



Key Features of the TTM

- Deals with intentional behaviour change
- Views change as a process rather than an event
- The change process is characterised by a series of stages of change
- In attempting to change a behaviour a person typically cycles through these stages of change



Stages as discontinuities in “state of mind”

- From a communication perspective, what you say to a smoker depends on their psychological position or stage of change.
- Some questions change meaning and/or only having meaning from some positions.

e.g. i It makes no sense to ask a Precontemplator “How determined are you to quit smoking?”

ii The question “How confident are you in your ability to quit smoking permanently?” , changes meaning:

To a Precontemplator, it is an abstract question about ability.

To a Preparer, it also incorporates self-assessed motivation.

To someone in Action, it is a reflection on how they are going.

- Stages or positions are important in understanding behavior change.



Two Main Types of Change Processes

- Cognitive change processes
 - *Involve changes in the way people think about their smoking*

Behavioural change processes

- *Involve people developing new habits. It takes time and practice to feel comfortable acting in new ways.*



Relationship between Processes and Stages of Change

Cognitive change processes help people to move through the early (and late) stages

- Research is showing that cognition is important at all stages

Behavioural change processes help people to move through the later stages of change

i.e. from making a quit attempt to staying quit, but practice important



Decisional Balance

- **Decisional balance is the importance a person gives to the perceived advantages (pros) and disadvantages (cons) of smoking, and of quitting**
- **An individual's motivation to change is affected by his/her decisional balance**
- **Evidence suggests that long and short term consequences are not balanced**



Self-efficacy

- TTM empirically equates self-efficacy and task difficulty (inverse)
- Evidence is that these are two distinct, although related concepts



Transtheoretical Model Stages

Limitations

- Pre-quitting stages conceptually confused.
 - Preparation compounds intention and past action
- Post-quitting stages arbitrary.
- Not grounded in strong empirical evidence.

Critical test

- Combining groups across stage boundaries should reduce prediction



Evidence of predictive discontinuities

Prequitting

- Interested in quitting at all vs. not
- Actively thinking vs. open to possibility
- Decided quit date. vs not
- Recent quitting activity (last month)



Quitting is a major position change

- Prequitting the person smokes and may have thoughts about stopping and of the consequences.
- Postquitting the person no longer smokes, is experiencing some of the consequences and as a result may have thoughts about the challenge of persisting.
- Typically quitting is planned but relapse is not;
 - thus positions around intentions may be important before quitting smoking, but they are unlikely to be important post-quitting.



Tasks post-cessation

Survival: The week or so after quitting when withdrawal symptoms are often unpleasant.

Consolidation: Dealing with urges to smoke effectively

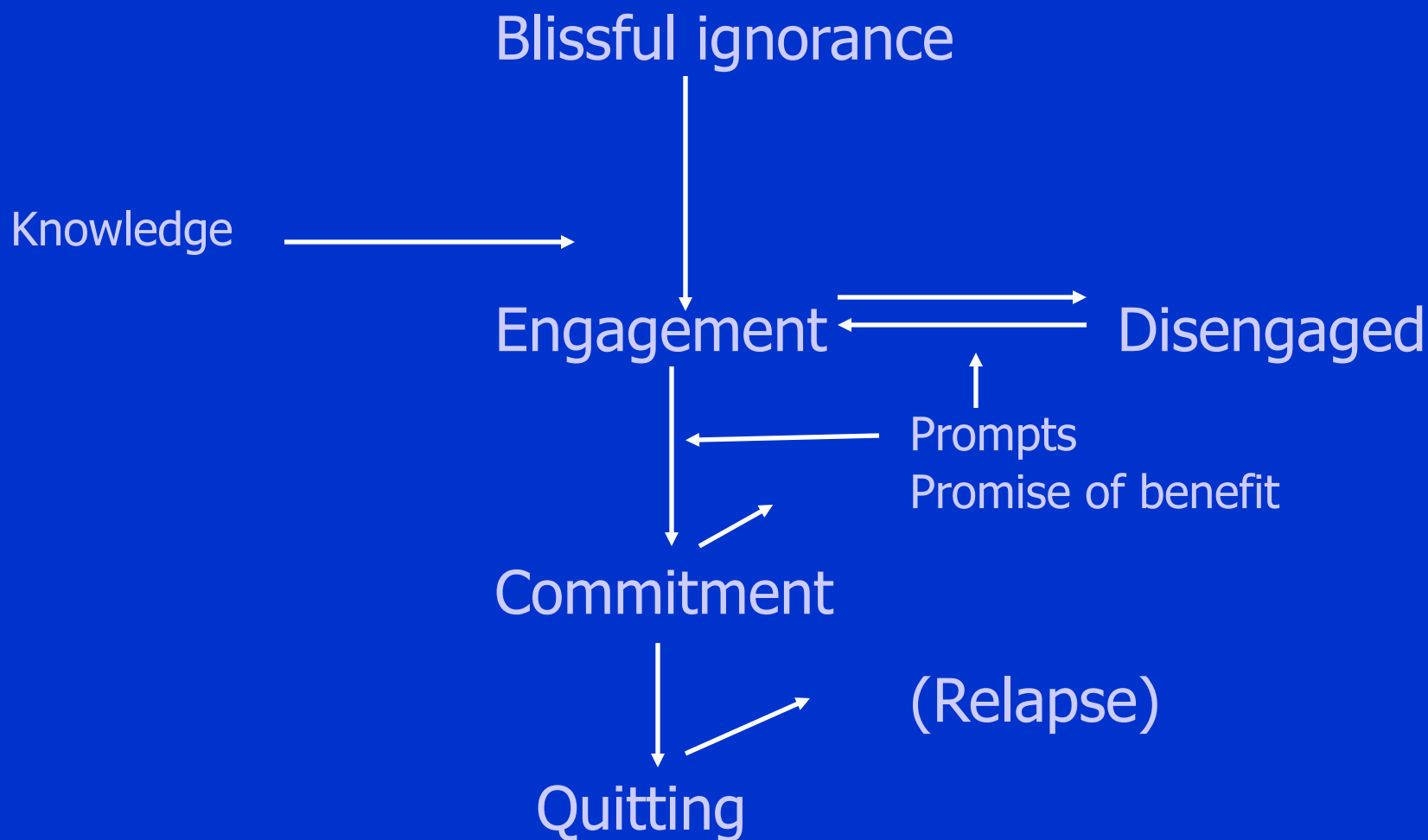
Becoming a non-smoker: Learning to think and act like a non-smoker



How is the Model Useful?

- Provides a framework for understanding the process of how people change
- Recognises that people in different stages of change need different types of interventions to help them progress
- Basic model needs refinement, in part in ways suggested





Steps in progress towards smoking cessation



Changing nature of tasks for change

- To decide quitting is worth thinking about
- To think about it
- To decide to do it
- To implement the attempt
- To survive withdrawal
- To learn new skills and unlearn old ones
- To come to think and act like a non-smoker



Towards a reconceptualisation of change

- Where to if TTM is inadequate?
- Other gaps?
- Outline of an alternative comprehensive theory.



Ambivalence

- Short term contingencies create powerful emotionally charged incentives for use
- Long term consequences create large, but typically abstract, incentives to quit use
- Cessation is a triumph of rationality over immediate contingencies



No replacement behaviour

- If there was a harmless drug or activity that provided all the immediate benefits of tobacco use without any of the harms,
- Everybody would have already switched
- Much less harmful partial replacements are becoming available
 - *Clean smokeless, including e-cigarettes*



Competing priorities

- Smoking not a road block behaviour
 - *Incidental to main life goals*
 - *Sometimes seen as facilitatory*
- Strong incentives to delay dealing with it
- Interest ebbs and flows
- Need external prompts to maintain interest



Helping the ambivalent

- Go to where they are
 - *Engage them in the issue*
- Systems to generate engagement
 - *Mass media*
 - *Health professionals*
 - *Pack warnings*
 - *Price etc*
- Offer programs that can really help
 - *Provide structures to maintain engagement*
 - *Discourage premature claims of success*

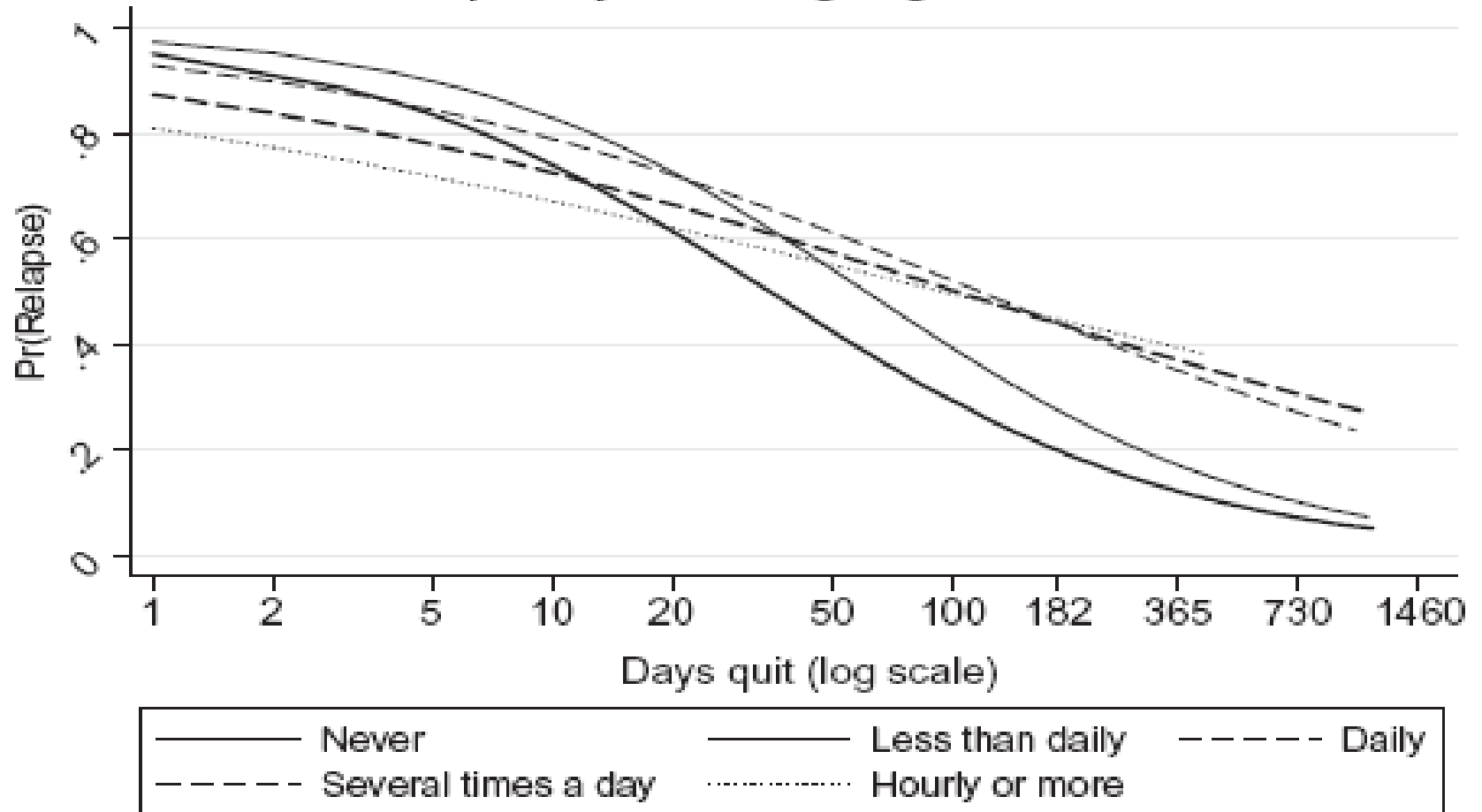


Some puzzling findings

- The more you are motivated to quit the less likely you are to succeed, given that you try
- Recent quitting experience predicts failure next time
- We don't understand addiction
 - *Our best measure does not predict relapse beyond the first month*
 - *Post-quit urges are predictive*
 - *Although conditions for abstinence improve, relapse is still common*



Frequency of strong urges to smoke



Predictors of making quit attempts

- All seven measures were predictive of making attempts when controlling for sociodemographics
- When considered as a set, key predictors are:
 - *Wanting to quit*
 - *Prematurely stubbing out*
 - *? Health concerns and Benefits of quitting (one wave each)*
- Adding dependence related measures, intention to quit, self-efficacy, recent quit attempt and an index of motivation to smoke does not change this
 - *All except self-efficacy were associated with quit attempts in the expected direction*
- These variables are clearly important determinants of making quit attempts

Attempts: Adjusted Odds Ratios (95% CI's) for Each Core Variable

Core Predictor Variable	1. Demographics	2. Positive motivational variables	3. Self-efficacy, intention to quit, quit recency & motive to smoke.	4. HSI, daily/non-daily, longest attempt.
Want to quit				
Wave 3 to 4	1.83 (1.72 – 1.94)	1.61 (1.49 - 1.73)	1.23 (1.13 – 1.35)	1.22 (1.11 – 1.33)
Wave 4 to 5	1.92 (1.8 – 2.05)	1.62 (1.50 – 1.76)	1.24 (1.12 – 1.37)	1.25 (1.13 – 1.38)
Wave 5 to 6	1.99 (1.86 - 2.12)	1.73 (1.60 – 1.88)	1.33 (1.21 – 1.47)	1.31 (1.19 – 1.45)
Freq of butt out				
Wave 3 to 4	1.43 (1.35 – 1.50)	1.21 (1.14 – 1.28)	1.10 (1.04 – 1.18)	1.08 (1.02 – 1.16)
Wave 4 to 5	1.49 (1.41 – 1.57)	1.24 (1.17 – 1.32)	1.14 (1.06 – 1.21)	1.12 (1.05 – 1.20)
Wave 5 to 6	1.35 (1.28 - 1.43)	1.12 (1.06 – 1.19)	1.04 (0.97 – 1.11)	1.03 (0.96 – 1.10)
Financial cost				
Wave 3 to 4	1.32 (1.24 – 1.41)	0.96 (0.89 – 1.04)	0.98 (0.90 – 1.06)	0.99 (0.92 – 1.08)
Wave 4 to 5	1.42 (1.33 – 1.52)	1.03 (0.95 – 1.11)	1.03 (0.94 – 1.12)	1.07 (0.98 – 1.16)
Wave 5 to 6	1.35 (1.26 – 1.45)	0.97 (0.90 – 1.06)	0.96 (0.89 – 1.05)	0.98 (0.90 – 1.06)
Health concern				
Wave 3 to 4	1.82 (1.69 – 1.96)	1.05 (0.95 – 1.17)	0.98 (0.88 – 1.09)	0.98 (0.88 – 1.10)
Wave 4 to 5	1.98 (1.83 – 2.15)	1.10 (0.98 – 1.11)	1.04 (0.92 – 1.18)	1.03 (0.91 – 1.16)
Wave 5 to 6	1.99 (1.83 – 2.16)	1.17 (1.04 – 1.31)	1.11 (0.98 – 1.25)	1.10 (0.97 – 1.24)
Benefit if quit				
Wave 3 to 4	1.43 (1.35 – 1.50)	1.10 (1.03 – 1.18)	1.09 (1.02 – 1.16)	1.10 (1.03 – 1.18)
Wave 4 to 5	1.41 (1.33 – 1.49)	1.04 (0.97 – 1.12)	1.04 (0.96 – 1.12)	1.05 (0.98 – 1.14)
Wave 5 to 6	1.39 (1.32 - 1.46)	1.00 (0.93 – 1.07)	1.01 (0.94 – 1.08)	1.01 (0.94 – 1.09)
Enjoy life if quit				
Wave 3 to 4	NA	NA	NA	NA
Wave 4 to 5	1.45 (1.36 – 1.54)	1.07 (0.99 – 1.15)	1.03 (0.95 – 1.11)	1.04 (0.96 – 1.12)
Wave 5 to 6	1.43 (1.34 - 1.52)	1.06 (0.99 – 1.14)	1.02 (0.94 – 1.10)	1.03 (0.95 – 1.11)
Overall attitude				
Wave 3 to 4	1.43 (1.34 – 1.53)	1.07 (1.00 – 1.16)	1.05 (0.97 – 1.13)	1.05 (0.97 – 1.13)
Wave 4 to 5	1.45 (1.35 – 1.56)	1.06 (0.97 – 1.15)	1.03 (0.95 – 1.11)	1.03 (0.94 – 1.12)
Wave 5 to 6	1.46 (1.36 – 1.56)	1.08 (0.99 – 1.16)	1.04 (0.96 – 1.13)	1.05 (0.97 – 1.14)

Note: Figures are odds ratios and 95% confidence intervals.

Wave 3 to 4 (n = 5064 valid + 305 missing), wave 4 to 5 (n = 4585 valid + 258 missing), wave 5 to 6 (n = 4633 + 258 missing)

Predictors of sustained abstinence

- All 7, except attitude to smoking, predict **relapse**
 - *most consistently*
- When analysed together:
 - *Wanting to quit, premature butting out, and financial cost all predict relapse*
- Adding dependence related measures, intention to quit, self-efficacy, recent quit attempt and an index of motivation to smoke leaves only premature butting out
 - *A recent quit attempt and higher dependence also predict relapse, and higher self-efficacy was associated with success.*
- Many motives driving quit attempts play no positive role in sustaining abstinence

Table 3. Success: Adjusted Odds Ratios (95% CI's) for Each Core Variable

Core Predictor Variable	1. Demographics	2. Positive motivational variables	3. Self-efficacy, intention to quit, quit recency & motive to smoke.	4. HSI, daily/never, longest attempt.
Want to quit				
Wave 3 to 4	0.89 (0.78 – 0.99)	0.95 (0.83 – 1.09)	0.96 (0.82 – 1.13)	1.00 (0.85 – 1.17)
Wave 4 to 5	0.81 (0.72 – 0.91)	0.83 (0.71 – 0.96)	0.90 (0.75 – 1.08)	0.90 (0.75 – 1.08)
Wave 5 to 6	0.77 (0.68 – 0.87)	0.86 (0.74 – 0.99)	0.95 (0.80 – 1.14)	0.96 (0.80 – 1.15)
Freq of butt out				
Wave 3 to 4	0.91 (0.83 – 0.99)	0.94 (0.85 – 1.03)	0.93 (0.84 – 1.02)	0.90 (0.81 – 1.00)
Wave 4 to 5	0.88 (0.80 – 0.97)	0.90 (0.82 – 1.00)	0.90 (0.81 – 1.01)	0.89 (0.80 – 0.99)
Wave 5 to 6	0.83 (0.74 – 0.92)	0.87 (0.78 – 0.97)	0.89 (0.79 – 0.99)	0.85 (0.76 – 0.96)
Financial cost				
Wave 3 to 4	0.81 (0.72 – 0.91)	0.83 (0.73 – 0.94)	0.84 (0.74 – 0.96)	0.89 (0.78 – 1.01)
Wave 4 to 5	0.82 (0.72 – 0.93)	0.85 (0.74 – 0.98)	0.87 (0.75 – 0.99)	0.91 (0.79 – 1.05)
Wave 5 to 6	0.89 (0.78 – 1.02)	1.01 (0.88 – 1.17)	1.04 (0.90 – 1.20)	1.12 (0.96 – 1.30)
Health concern				
Wave 3 to 4	0.87 (0.77 – 0.99)	1.04 (0.86 – 1.25)	1.04 (0.86 – 1.26)	1.04 (0.86 – 1.26)
Wave 4 to 5	0.89 (0.77 – 1.03)	1.17 (0.95 – 1.44)	1.22 (0.99 – 1.51)	1.20 (0.97 – 1.49)
Wave 5 to 6	0.72 (0.62 – 0.83)	0.82 (0.66 – 1.00)	0.86 (0.70 – 1.07)	0.85 (0.68 – 1.05)
Benefit if quit				
Wave 3 to 4	0.92 (0.83 – 1.01)	0.98 (0.87 – 1.10)	0.97 (0.86 – 1.09)	0.99 (0.88 – 1.12)
Wave 4 to 5	0.95 (0.85 – 1.05)	1.06 (0.93 – 1.21)	1.05 (0.92 – 1.20)	1.08 (0.94 – 1.23)
Wave 5 to 6	0.88 (0.79 – 0.97)	1.00 (0.88 – 1.14)	0.99 (0.87 – 1.12)	0.99 (0.86 – 1.13)
Enjoy life if quit				
Wave 3 to 4	NA	NA	NA	NA
Wave 4 to 5	0.89 (0.79 – 0.99)	0.93 (0.82 – 1.06)	0.92 (0.81 – 1.05)	0.92 (0.81 – 1.05)
Wave 5 to 6	0.90 (0.80 – 0.99)	1.00 (0.88 – 1.14)	1.02 (0.89 – 1.16)	1.06 (0.92 – 1.22)
Overall attitude				
Wave 3 to 4	0.95 (0.84 – 1.06)	1.00 (0.88 – 1.14)	1.00 (0.88 – 1.14)	1.01 (0.88 – 1.16)
Wave 4 to 5	0.90 (0.79 – 1.02)	0.94 (0.82 – 1.08)	0.93 (0.80 – 1.07)	0.95 (0.82 – 1.10)
Wave 5 to 6	0.91 (0.81 – 1.04)	1.04 (0.90 – 1.19)	1.02 (0.89 – 1.18)	1.02 (0.88 – 1.18)

Note: Figures are odds ratios and 95% confidence intervals.

Wave 3 to 4 (n = 1994 valid + 127 missing), wave 4 to 5 (n = 1662 valid + 103 missing), wave 5 to 6 (n = 1638 valid + 141 missing)

How do we explain this?

- **Why the possible negative effect of motivation?**
 - *Could be residual confounding with difficulty of the challenge:*
 - Assumes the highly motivated who are still smoking are those with least capacity to quit
 - *Could be we are measuring abstract desire not likelihood of committing effort*
- **Need to develop a coherent theory of behavioural maintenance for hard-to-change behaviours like smoking.**
 - *Such a model needs to begin with consideration of the experiences of the new behaviour pattern (see Rothman, 2000, and others)*
 - *However, needs to go beyond this to provide a framework for understanding maintenance in the face of negative experiences*
 - *Needs to rethink what is meant by motivation and how motivation to act may differ from motivation to persist*

Is this perverse effect universal?

- Not finding it in Asia
- ? Cultural
- Short history of encouraging cessation
 - *Still plenty of low-moderately addicted smokers*
- OR?



Financial stress and quitting

	Financial stress			
	N	NO	YES	Multivariate OR
Interest in quitting	3265	69%	83%	1.71 (1.19-2.46)
Quit attempts	3265	37%	38%	0.74 (0.56-0.96)
Quit success	1160	31%	20%	0.52 (0.31-0.87)

Siahpush et al, In press



What does this all mean?

- We can choose to try to quit
- But we cant choose to succeed
- We can increase our chances
 - *Commit yourself to put in the hard yards*
 - *Use the best possible help*
 - Medication + Structured advice
- BUT, some of the things that motivate trying, might also get in the way of success
- **Smoking is a quintessential addiction**



Theories of behaviour change

- Typically assume common processes for trying and succeeding
- Often grounded in experimental studies where focus is short term outcomes and/or easy-to-change behaviours
- Good at predicting trying
- Poor for maintenance



C-Theory:

A theory of hard to maintain behaviour change



Essence of C-Theory

Contest between

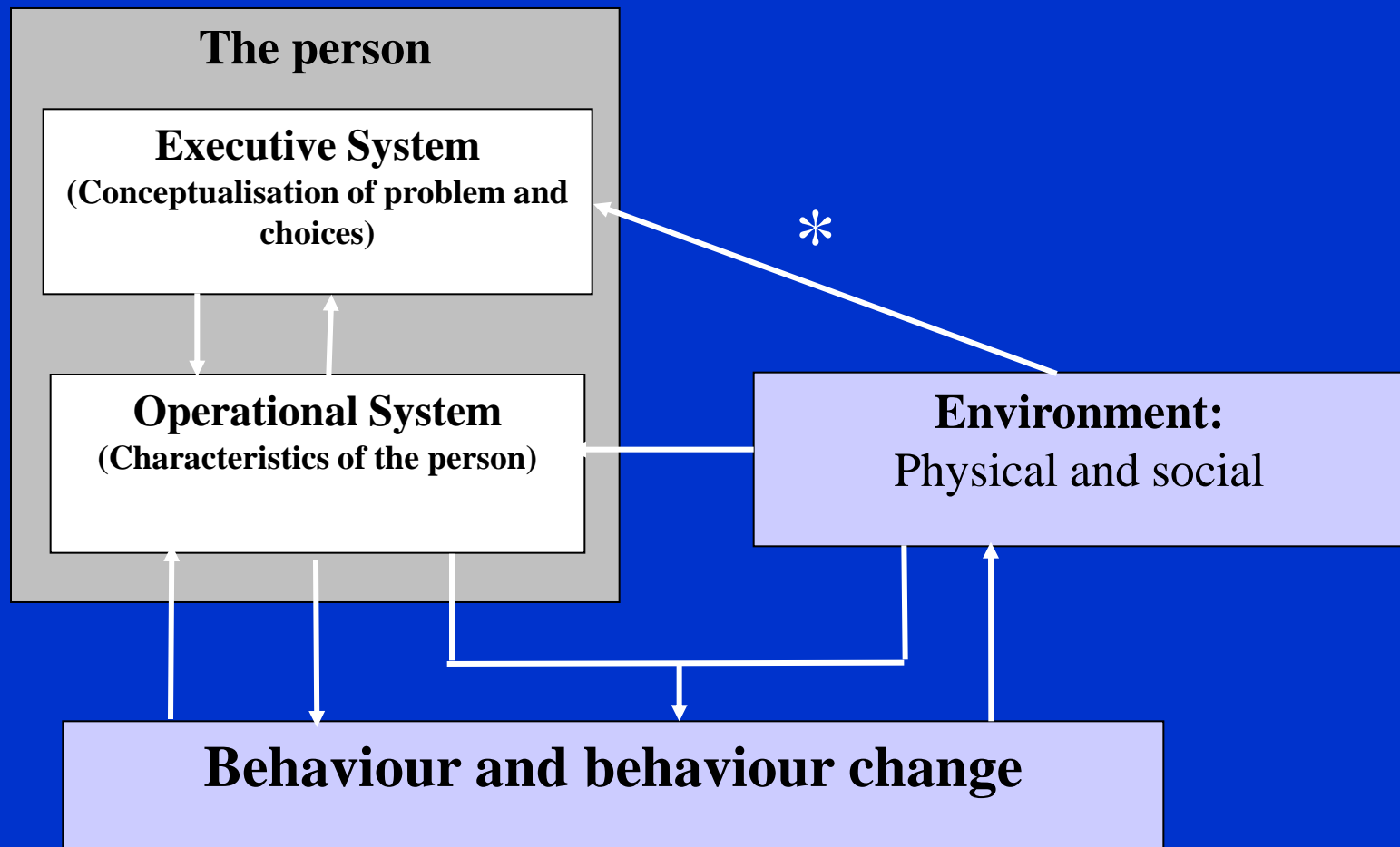
- Unconscious (often), automated (including conditioned) responses to the world (Operational system);
- and
- Conscious decisions as to what is in our best interests (Executive system)



Conceptual underpinnings

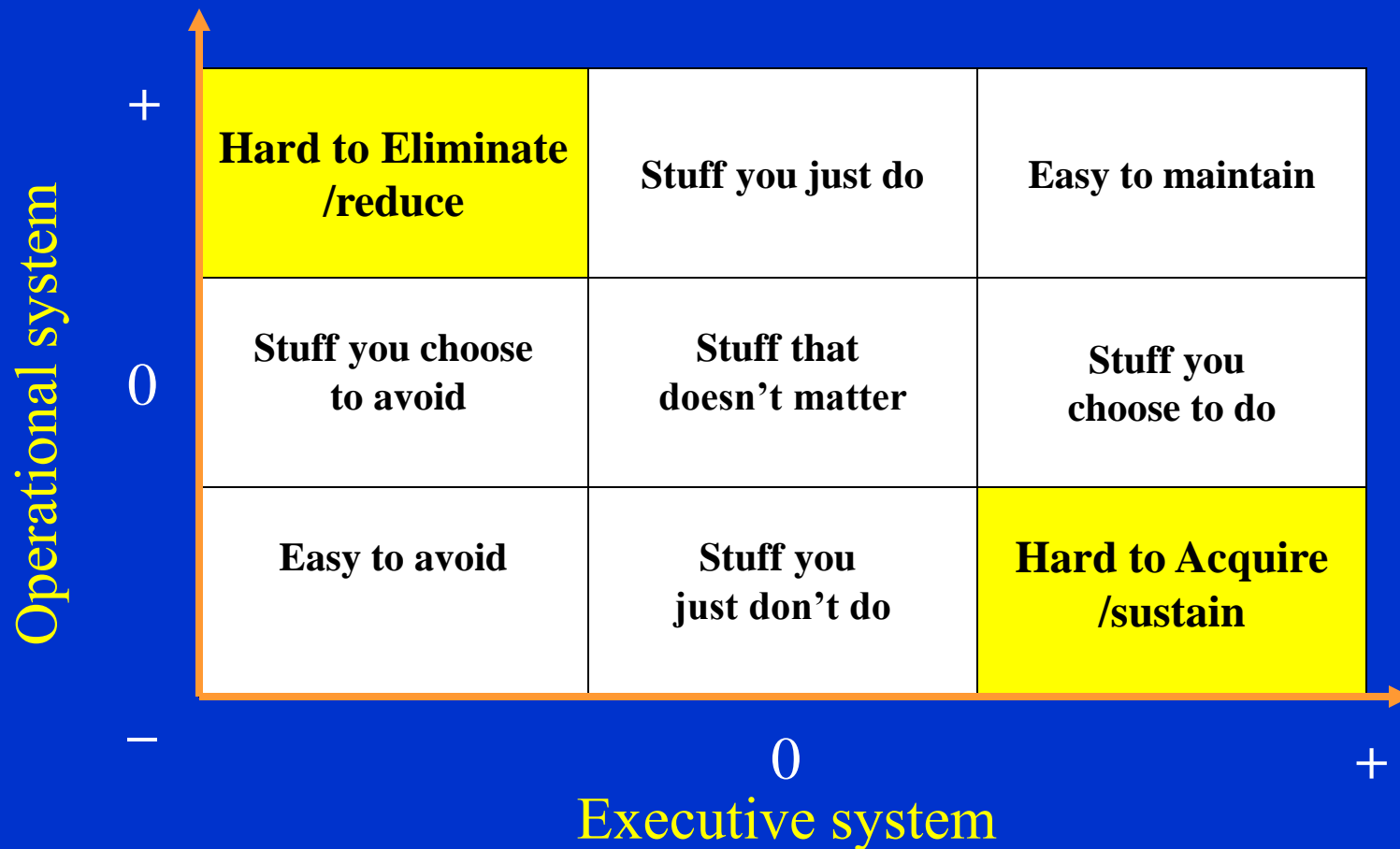
- Emergent materialism
- Importance of basic, non-volitional factors
- Limits of human rationality or self-regulatory capacity





Major interrelationships between behaviour and its major determinants

- This link is actually through the OS, it parallels the sensory reactive pathway, but as it is functionally different, it is useful to depict it as direct.



**The implications for behaviour of different strengths
and directions of impulses to action from OS and ES**

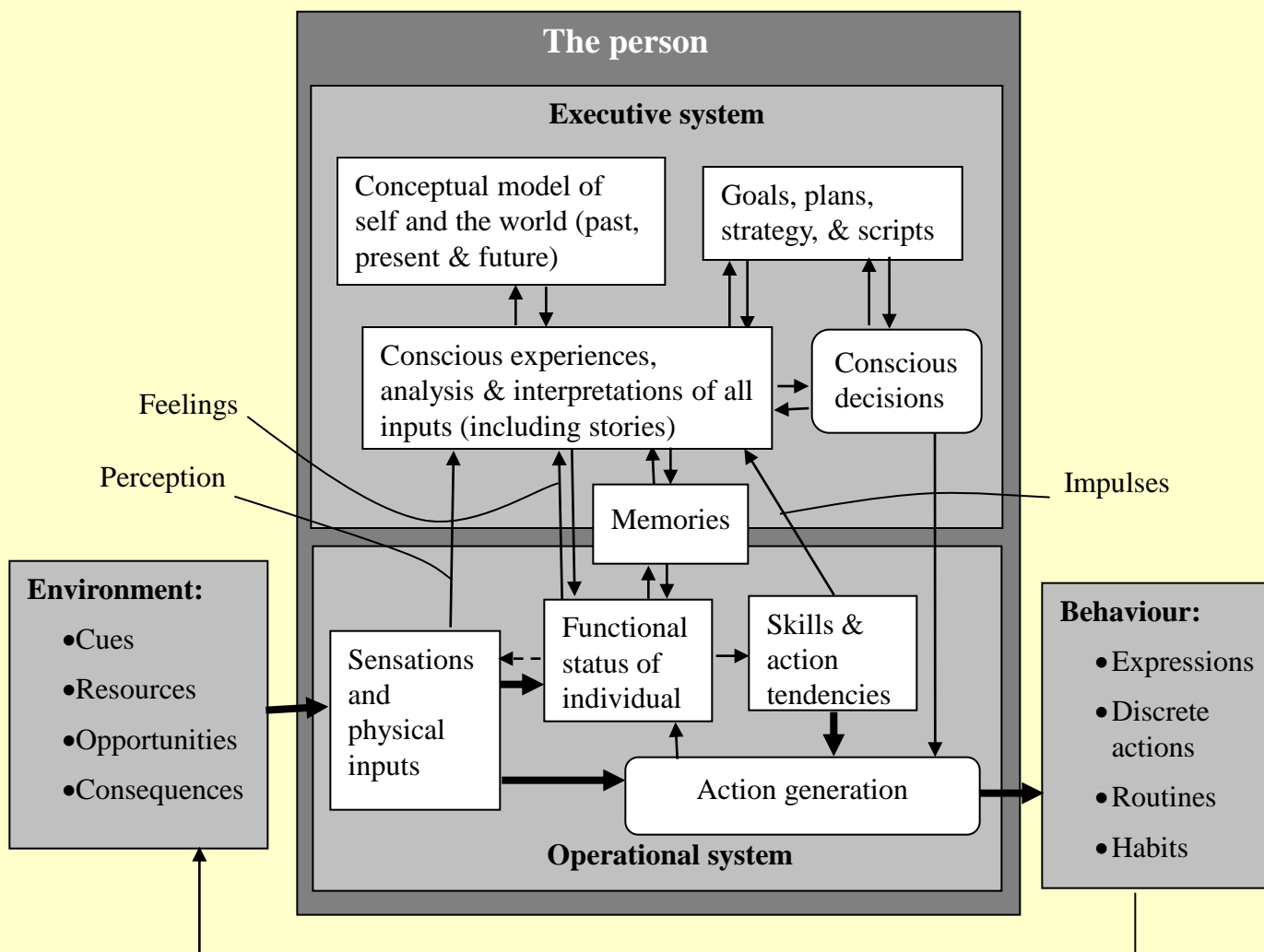
Action is generated by the OS

- in relation to environmental stimuli and input from internal states
 - Based on conditioning

Roles of the Executive System (ES)

- Analyses situation to identify problems
- Sets goals for behaviour
- Monitors behaviour in terms of progress towards goals
- Creates contexts to encourage OS to act in desirable ways
- Interprets inputs from OS as a basis of action
- Exerts self-control





A schematic diagram of the relationships between the two human systems and how they relate to both the environment and behaviour

- **Rationally generated goals need affective force to overcome affectively charged action tendencies to persist.**
- **Affective reactions to behaviour are retained in memory more strongly than conceptualisations of the source of the affect.**
- **Affective reactions both shape and are shaped by behaviours.**



Main functions of self-regulation

- Identify advantageous changes in behaviour
- Use self-control to inhibit undesirable behaviours
- Support creation of contextual conditions supporting desirable alternative actions
- Change framing of understanding of reasons for behaving so the OS is more likely to choose desirable options.
 - Neglected, but important role



Challenges

ES priorities do not automatically arise

- **Organisation of ideas critical to eliciting them when needed**
- **Implementation intentions (Gollwitzer) and hierarchical organisation – help activate ES concepts when needed**
 - **Make reasons for staying quit salient when craving**

ES needs to specify “what not to do”

- **In doing so, it evokes the idea**
 - **Ironic Processes (Wegner), can lead to relapse**



Negative affect stimulates action

- Smoking often seen as a means of reducing or managing negative affect
- Thus is a potent trigger for relapse

Can't condition associations to absence of something

- Positive experiences of not smoking does not protect against relapse

Fear of consequences only suppress the habit

- Conditioned links remain after quitting
- Heightened risk of relapse continues for a long time

Substitutes should make quitting easier

- There have not been viable substitutes for most



Conclusions

- It is not surprising that quitting is so difficult.
- Understanding why should help us to develop better interventions.
- These may look very different to some of our current methods.
- Self-regulation is far more than self-control and the exercise of willpower



Key aspects of C-Theory

- Primacy of action with OS
 - *Requires greater focus on role of emotion*
- Takes consciousness seriously
 - *Critical role for change story (before change)*
- Reinterprets decisional balance and temporal discounting
- Explains episodic nature of change attempts
- Distinguishes between self-control and task re-evaluation as change tools
- Explains why initiation and maintenance have different determinants
- Explains the problems with “saying NO”



Borland R. Understanding Hard to Maintain Behaviour Change.

Blackwell-Wiley (expected early 2014, but still being written)

Thanks to numerous collaborators and colleagues and to major funders of the research that stimulated this thinking including NHMRC.



Experiences of outcomes

- Experiences after acting are more powerful than continuing expectancies
- Many effects of HTM behaviour change are not directly experienced
 - *Eg, reduced risk of disease*
- Thus motivation based on such things can be vulnerable to other factors
 - *eg. worry about future disease may not decline*
 - *Feeling better may not be linked by OS to the behaviour change*



Positive and negative experiences

- Negative experiences motivate changing behaviour
- Even non-contingent negative feelings
- Positive feelings have less motivational force for action
 - *NB Anticipation of positives is a potent force for action*



Components of change stories

- How we think determines how we act
- Most of the key components of change stories are parts of expectancy value theories
 - *Outcome expectancies*
 - *Self-efficacy*
 - *Task difficulty*
 - *Intention*



Outcome expectancies

- Not organised in terms of Pros and cons as are other models
- Balance is between
 - *net OS tendencies to engage in unwanted behaviour (desirable in the moment), and*
 - *ES tendencies to choose more appropriate long-term options*



Task difficulty

- Analytic assessment
 - *Influenced by past experiences,*
 - *Including observation of others*
- Determines the resources that will be committed and the need for planning
- Can be independent of self-efficacy for difficult tasks



Self-efficacy

- Conceptualised essentially as Bandura does
- But separates SE for initiation and for persistence and acceptance



Novel constructs

- **Priority**
 - *How it fits in with other life tasks*
 - *A required element of Commitment, but one that relates the task to the rest of the person's world*
- **Commitment**
 - *More than the decision, it is operationalized in terms of the person's script for action*
 - *Influenced dynamically by other ES as well as OS functions*



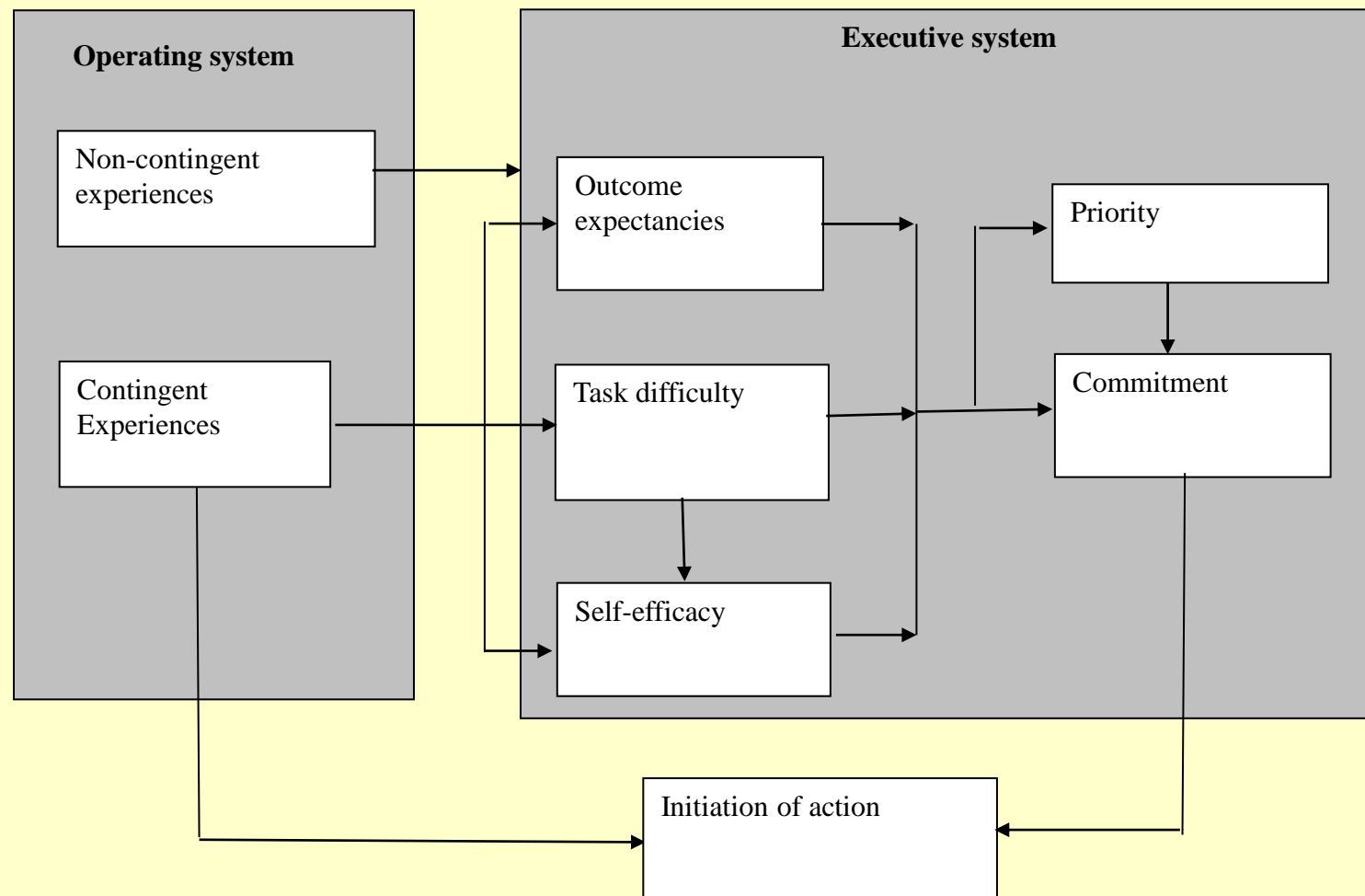


Figure 4. Simplified diagram of the determinants of the initiation of Action.

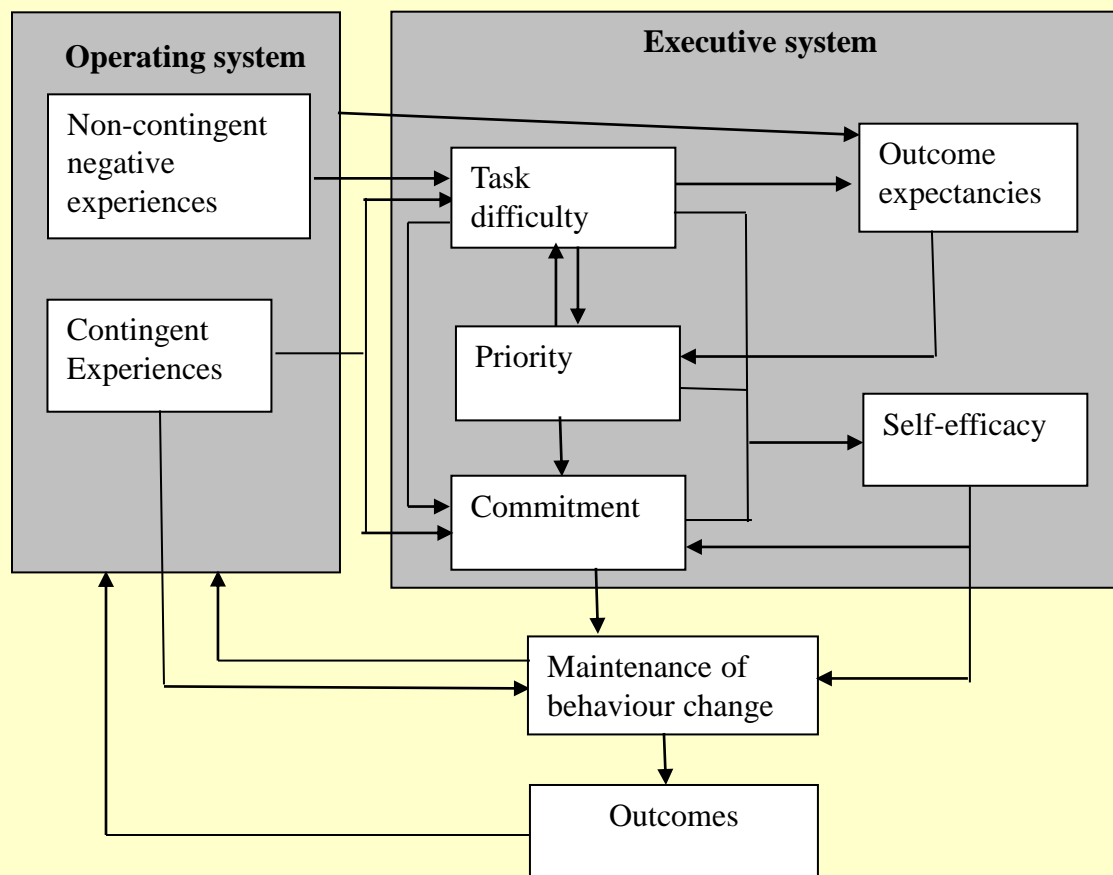
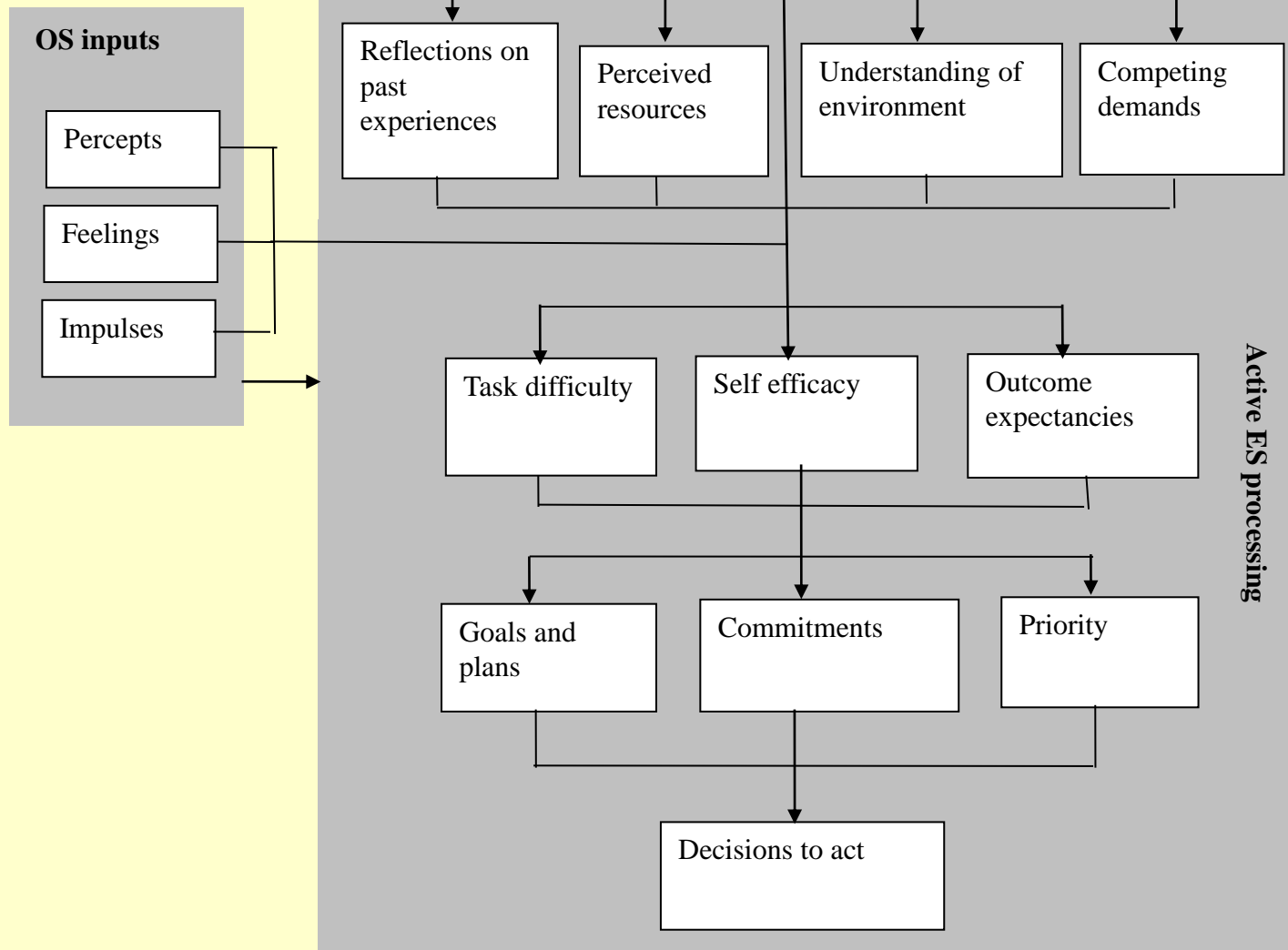
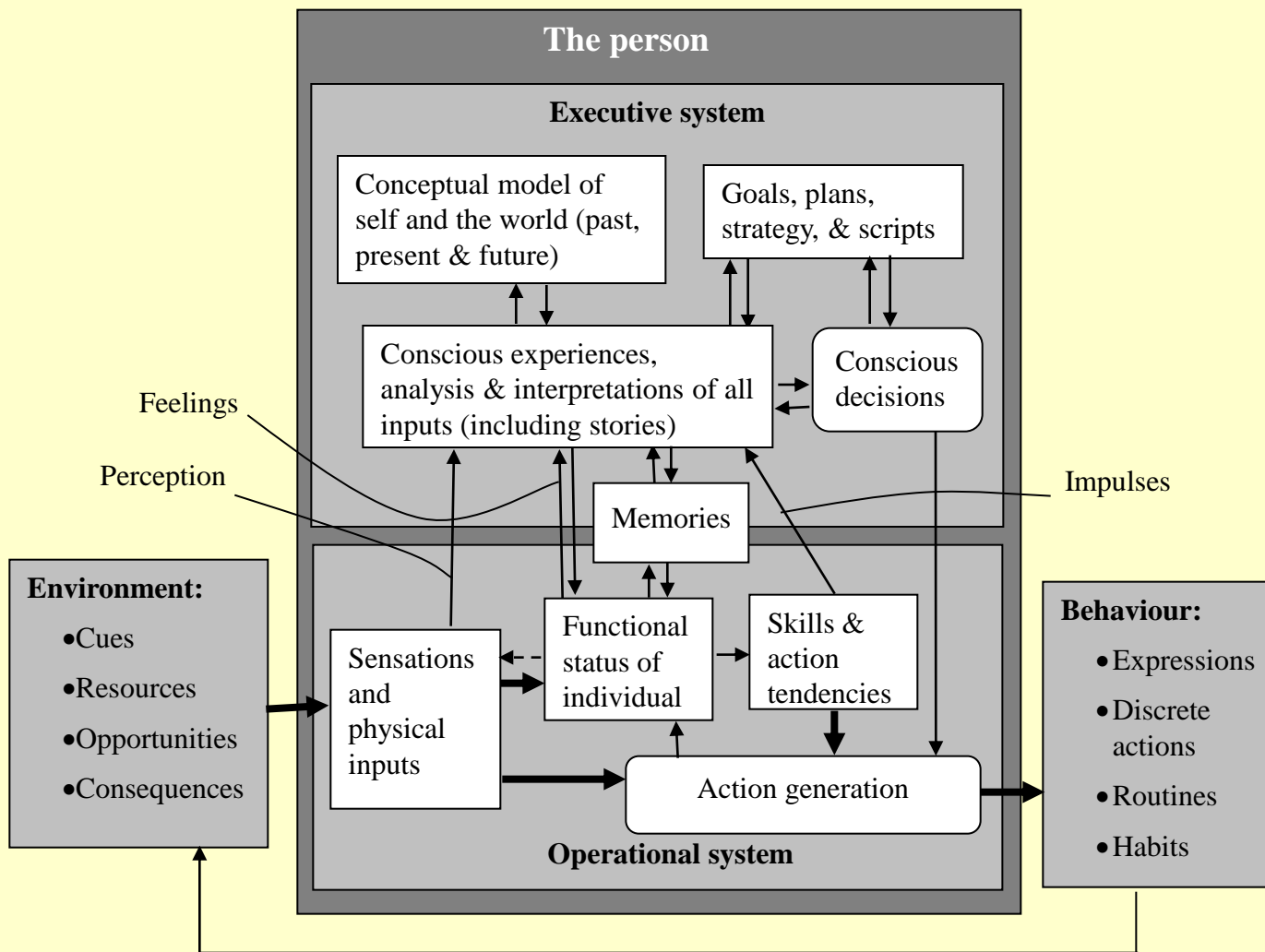


Figure 6. Simplified diagram of the determinants of maintenance of Action.





A schematic diagram of the relationships between the two human systems and how they relate to both the environment and behaviour

Borland R. Understanding Hard to Maintain Behaviour Change.

Blackwell-Wiley (expected early 2014, but still being written)

Thanks to numerous collaborators and colleagues and to major funders of the research that stimulated this thinking including NHMRC.

