

# The Role of Interoceptive Conditioning in Intuitive Eating Interventions

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## CONDITIONING APPETITE CUES

Eating behaviour is often performed as a response to a conditioned appetite cue

- Food is an unconditioned stimulus (US) that, upon exposure, elicits an unconditioned response (UR) such as a physiological reaction.
- Classical conditioning refers to the process of associating a conditioned stimulus (CS) with the US resulting in a conditioned response (CR), akin to the UR.
- Appetite cues** are CS's that are paired with food as an US.<sup>1</sup> They are usually some sort of signal preceding food intake, that become conditioned as a cue.
- Cues can either prompt, increase, or limit food intake.
- As a CS, appetite cues prepare the body for food intake through physiological reactions such as salivation.

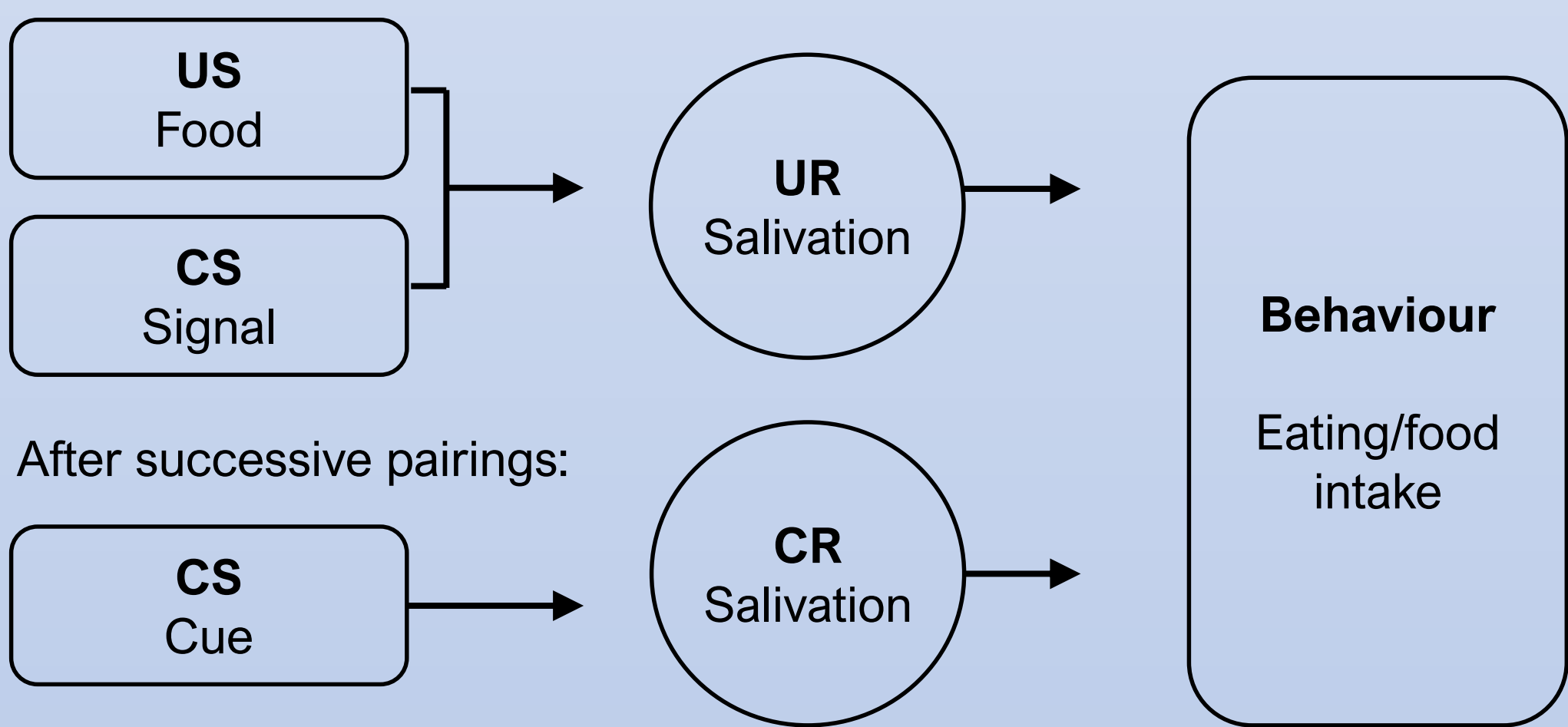


Figure 1: Conditioning signals into appetite cues

- Internal cues** are CS's associated with one's own physiological state, such as signals of hunger and satiety.<sup>2</sup>
- External cues** as a CS can signal either social norms, or sensory aspects signalling the hedonic value of the food itself.<sup>3</sup>

Table 1.

Taxonomy of external cues affecting food intake <sup>3</sup>

	Cue	Description
Normative	Social modelling	The presence of others
	Portion size	Plate sizes, unlimited food available
	Mindless eating	Watching tv etc...
Sensory	Hedonic value	Sensory gratification

- Interoception** is the ability to monitor internal states, and **Interoceptive conditioning** refers to a form of classical conditioning where either the CS or US is a physiological signal.<sup>4-5</sup>
- Healthy eating, for purposes of homeostasis, is performed in response to internal cues and is thus the product of interoceptive conditioning.

## APPETITE CUES & BINGE EATING

Disordered eating can also be explained as the result of conditioning

- Binge eating behaviour, such as that seen in Binge Eating Disorder (BED), and Bulimia Nervosa (BN) reflects a failure to eat in response to cues signalling hunger and satiety.<sup>1</sup>
- Individuals with BN and BED show greater reactivity to external sensory cues, and decreased reactivity to internal cues signalling fullness.<sup>6-7</sup>
- Eating for emotional purposes has been associated with reduced interoceptive abilities.<sup>11</sup>

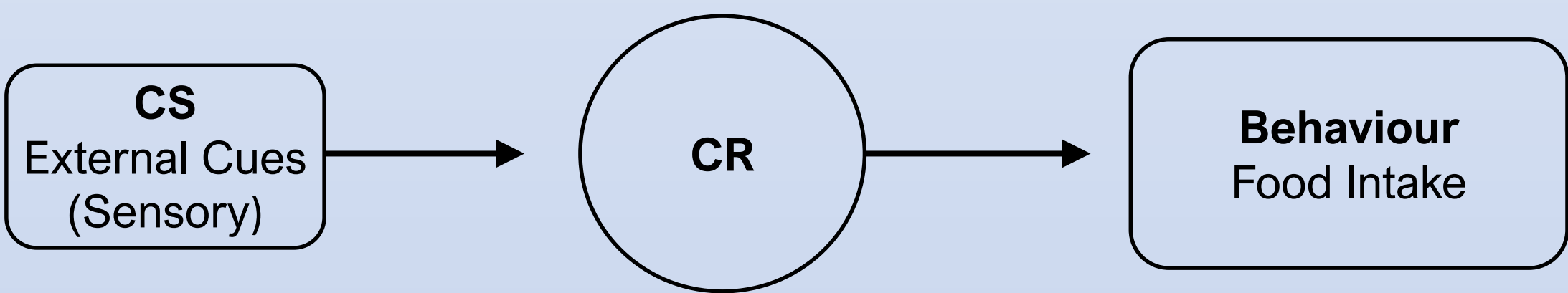


Figure 2: Sensory signals as conditioned cues in binge-eating behaviour

## APPETITE CUES & INTUITIVE EATING

Interventions for binge eating that increase interoceptive awareness and accuracy may be necessary to ensure long success.

- Alexithymia, considered the absence of interoception, has been shown to moderate the efficacy of eating disorder interventions.<sup>8</sup>
- Intuitive eating** refers to eating behaviour as the result of internal cues as the CS, and its absence is often implicated in disordered eating behaviours.<sup>9</sup>
- Intuitive eating habits have been shown to be inversely associated with chronic dieting and binge eating behaviours among adolescents.<sup>12</sup>
- For example, CBT-A addresses binge eating behaviour by training individuals to recognise and respond to internal signals of hunger and fullness.<sup>10</sup>
- This illustrates the presence of interoceptive conditioning as successive eating sessions performed in response to these signals has the effect of conditioning internal signals as appetite cues.

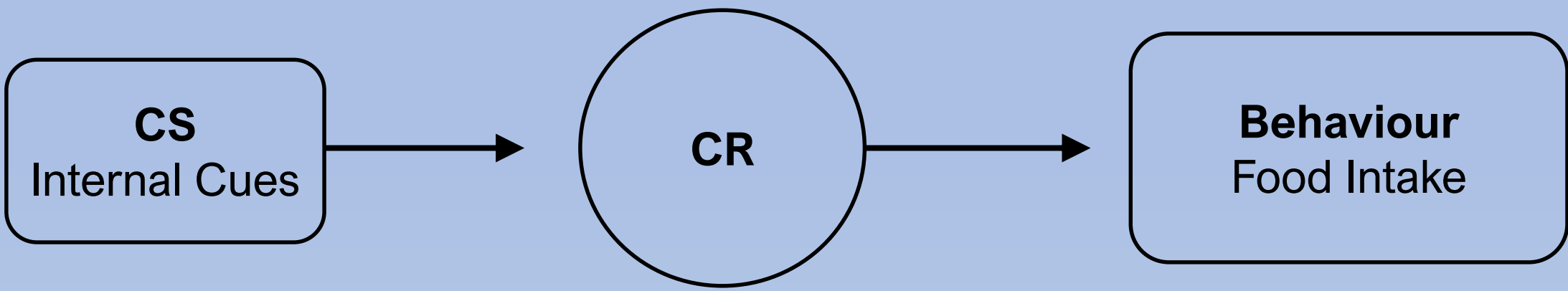


Figure 3: Internal signals as conditioned cues in intuitive eating behaviour

## DISCUSSION & CONCLUSIONS

- Treating eating disorders is an urgent issue in NZ. *He Ara Oranga*, the Mental Health and Addiction Inquiry in 2018 reported widespread concerns about the development of eating disorders in young people, and limited access to services for those with an eating disorder.<sup>14</sup>
- Given the way binge eating behaviour is conditioned, it is likely that interventions which fail to incorporate interoceptive conditioning will be successful in the long term.
- By encouraging individuals with binge eating problems to learn to respond to internal signals, intuitive eating interventions have the benefit of providing a technique that can generalise across contexts– making it more practical as a long term strategy in comparison to interventions which impose dietary restrictions.
- However, it is not clear that intuitive eating extinguishes the conditioning of external cues. At least one study has found that intuitive eaters were not immune to portion size effects.<sup>13</sup>
- This may be why interventions such as CBT-A include aspects of **mindful eating** such as monitoring food intake in relation to thoughts and feelings, as well as education about **appetite-focused food** choices in ensuring the food eaten produces salient internal signals.<sup>10</sup>
- Despite this, more research is needed to investigate the efficacy of cue exposure treatments to extinguish the conditioned response to external cues.

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