

Drugs *and* hugs: stimulating moral dispositions as a method of moral enhancement

MICHAŁ KLINCEWICZ¹, LILY EVA FRANK AND MARTA SOKÓLSKA²

Abstract

Advocates of moral enhancement through pharmacological, genetic, or other direct interventions sometimes explicitly argue, or assume without argument, that traditional moral education and development is insufficient to bring about moral enhancement. Traditional moral education grounded in a Kohlbergian theory of moral development is indeed unsuitable for that task; however, the psychology of moral development and education has come a long way since then. Recent studies support the view that moral cognition is a higher-order process, unified at a functional level, and that a specific moral faculty does not exist. It is more likely that moral cognition involves a number of different mechanisms, each connected to other cognitive and affective processes. Taking this evidence into account, we propose a novel, empirically informed, approach to moral development and education, in children and adults, which is based on a cognitive-affective approach to moral dispositions. This is an interpretative approach that derives from the Cognitive-Affective Personality System (Mischel, Shoda, 1995). This conception individuates moral dispositions by reference to the cognitive and affective processes that realise them. Conceived of in this way, moral dispositions influence an agent's behaviour when they interact with situational factors, such as mood or social context. Understanding moral dispositions in this way lays the groundwork for proposing a range of indirect methods of moral enhancement, techniques that promise similar results as direct interventions whilst posing fewer risks.

1. Direct vs Indirect methods of moral enhancement

The viability of the project of enhancing human morality by manipulating our brains with pharmaceuticals or direct brain stimulation

¹ Work on this paper was financed by the Polish National Science Centre (NCN) SONATA 9 Grant, PSP: K/PBD/000139 under decision UMO-2015/17/D/HS1/01705.

² All three authors worked equally on this chapter. Parts of it are based on on Marta Sokólska's masters thesis in cognitive science defended in 2016 at Jagiellonian University: "Udoskonalenie moralne w świetle nauk kognitywnych" (eng. "Moral enhancement in the light of cognitive science").

(hereafter, ‘moral bioenhancement’) is controversial among philosophers, neuroscientists, and psychologists. However, the motivations for widespread moral enhancement offered by its proponents remain persuasive. Our species may not be morally prepared to deal with rapid technological advance and a changing environment.³ Traditional non-invasive forms of moral enhancement, such as moral education, but also more structural political and institutional changes, have not been given much attention in the moral enhancement debate, with some exceptions.⁴ This is at least in part because the advocates of moral bioenhancement convincingly argue that moral education and other non-invasive means are not potent enough, do not act quickly enough, and have failed to work in the past. But pessimism about the efficacy of noninvasive means of moral enhancement is premature. We critically review promising methods and suggest new ones that take into account developmental psychology, neuroscience, and some themes from current debates in moral psychology.

In Section 2 we review evidence that moral cognition⁵ is multifaceted and sketch some of the characteristics of that complexity. In Section 3 we outline the cognitive-affective model of moral dispositions, recently articulated by Nancy Snow and Daniel C. Russell, among others. This model fits well with the complex picture of moral cognition discussed in Section 2. If this model is plausible, we can then create non-invasive methods of moral enhancement that target moral dispositions of the individual. Section 4 presents recent insights into child development and gives examples of

³ Persson, I., & Savulescu, J. (2011). Unfit for the future? Human nature, scientific progress, and the need for moral enhancement. *Enhancing human capacities*, 486–500.

⁴ See for example: Flanagan, O. (2016). *The Geography of Morals: Varieties of Moral Possibility*. Oxford University Press; Fröding, B. (2012). Virtue ethics and human enhancement. *Springer Science & Business Media*; Fröding, B., & Osika, W. (2015). *Neuroenhancement: How mental training and meditation can promote epistemic virtue*. Springer International Publishing; Powell, R. and Buchanan, A., “The Evolution of Moral Enhancement” in Coady, T., Sanyal, S., & Giubilini, A. (Eds.). *The Ethics of Human Enhancement: Understanding the Debate*. Oxford University Press.

⁵ We use the term ‘moral cognition’ as a shorthand for all the psychological mechanisms that underlie moral behaviour. These include the capacity to have beliefs, emotions, and other mental states or processes, which may but need not be connected to morality. It is important to note that we use the without making any commitment to a particular view of moral psychology as inherently cognitive as opposed to affective.

87 childrearing practices that can positively influence children’s moral
88 development. Section 5 gives examples of non-invasive practices
89 for adults that can take advantage of the cognitive-affective model
90 of moral dispositions. Section 6.1 and 6.2 consider objections to
91 our view and our replies.
92
93

94 **2. Moral cognition is multi-faceted**

95

96 There are, broadly speaking, two main contemporary theoretical
97 positions on the nature of moral cognition: the domain-specific and
98 the domain-general approach.⁶ Simplifying greatly, the domain-specific
99 approach assumes that there is a psychological mechanism dedicated
100 to moral functioning. The domain-general approach assumes that a
101 dedicated mechanism does not exist and that moral functioning is
102 realised by a number of other mechanisms.

103 According to the domain-specific approach, the moral mechanism
104 (or module) receives external inputs from, for example, the self, in-
105 tentions, or predictions about consequences of actions. On the basis
106 of these inputs, the moral mechanism generates a particular moral
107 output: a judgment, a reaction, a behaviour, etc.^{7,8} Arguably, the in-
108 spiration for this approach is the notion of universal grammar in lin-
109 guistics and the module that implements it. According to that theory,
110 people acquire and develop their linguistic abilities because they have
111 innate linguistic competencies, which interact with their linguistic
112 environment. The domain-specific approach predicts that there is a
113 similar set of competencies or dispositions to acquire morality.

114 John Rawls first brought attention to the possibility of applying the
115 sort of arguments one finds supporting the universal grammar ap-
116 proach in linguistics to moral functioning.⁹ Mikhail (2000, 2007)
117 and Hauser (2007) take up this idea and argue that an adequate
118 theory of morality will include an account of a computational mech-
119 anism responsible for bridging the gap between one’s perception of
120

121
122 ⁶ Young, L., & Dungan, J. (2012). Where in the brain is morality?
123 Everywhere and maybe nowhere. *Social Neuroscience*, 7(1), 1–10.

124 ⁷ Hauser, M., Cushman, F., Young, L., Kang-Xing Jin, R., & Mikhail,
125 J. (2007). A dissociation between moral judgments and justifications. *Mind*
126 *& Language*, 22(1), 1–21.

127 ⁸ Mikhail, J. (2007). Universal moral grammar: Theory, evidence and
128 the future. *Trends in cognitive sciences*, 11(4), 143–152.

129 ⁹ Rawls, J. (1971). *A theory of justice*. Cambridge, MA: Harvard
University, 46–47.

130 an act and one's emotional/cognitive reaction to it and eventual judg-
131 ment about it.

132 However, numerous studies that concern moral cognition show
133 that no specific neural structures or neural functions for morality
134 exist.¹⁰ This leads us to the alternative domain-general approach,
135 which is the view that no specific mechanism or module for moral
136 cognition exists. Instead, a number of other mechanisms, such as
137 the mechanisms of reasoning or affect, realise what we characterise
138 as moral cognition.^{11,12} This approach is general in the sense that it
139 assumes that moral cognition, moral development, and the process
140 of making moral judgments are unified at a functional level, but
141 not on a biological level.

142 On the domain-general approach, human morality is likely to be
143 realised by a higher-order cognitive function. If that is so, then
144 understanding the mechanisms of moral cognition demands an
145 analysis of the relationship between lower-order mechanisms
146 and how they interact to create moral judgments, dispositions,
147 and behaviours at a higher level of psychological organisation.^{13,14}
148 Moral cognition on this view is multi-faceted because it is a
149 higher-order domain-general function involving several lower-
150 level functions.

151 The other relevant feature of moral cognition is that it is affected by
152 many factors, some outside of the moral domain and often without
153 the individual's awareness.¹⁵ One's social context can impact one's
154 hierarchy of values, as well as the way in which one orders the
155

156
157 ¹⁰ For a review see: Greene, J. D. (2014). The cognitive neuroscience of
158 moral judgment and decision making. In Gazzaniga, M. S., editor, *The cog-*
159 *nitive neurosciences V*, pages 1013–1023. MIT Press and Greene,
160 J. D. (2015). The rise of moral cognition. *Cognition*, 135, 39–42.

161 ¹¹ Moll, J., Zahn, R., de Oliveira-Souza, R., Krueger, F., & Grafman,
162 J. (2005). The neural basis of human moral cognition. *Nature Reviews*
163 *Neuroscience*, 6(10), 799–809.

164 ¹² Moll, J., Oliveira-Souza, D., & Zahn, R. (2008). The neural basis of
165 moral cognition. *Annals of the New York Academy of Sciences*, 1124(1),
166 161–180.

167 ¹³ Casebeer, W. D., & Churchland, P. S. (2003). The neural mechan-
168 isms of moral cognition: A multiple-aspect approach to moral judgment
169 and decision-making. *Biology and philosophy*, 18(1), 169–194.

170 ¹⁴ Prinz, J. (2008). Is morality innate. *Moral psychology*, 1, 367–406.

171 ¹⁵ Van Bavel, J. J., Feldman Hall, O., & Mende-Siedlecki, P. (2015).
172 The neuroscience of moral cognition: from dual processes to dynamic
systems. *Current Opinion in Psychology*, 6, 167–172.

needs of others and one's own needs.¹⁶ Other experiments demonstrate that moral decisions preceded by conversations that are morally oriented are more likely to result in participants telling the truth than when the conversations are self-oriented.¹⁷

The third relevant feature of moral cognition is that it varies between individuals¹⁸ and within individuals over time.^{19,20} Furthermore, different cognitive mechanisms are crucial in the exercise of moral abilities at different times during human development. While affective structures are the most relevant in children, in adults structures connected to executive control and other higher order processes play a bigger role by integrating information about one's affective reactions with inferences about the mental states of others.²¹

This brief sketch of current empirical research and theoretical approaches to moral cognition and moral development strongly suggests that they involve many disparate mechanisms. Their complexity casts doubt on the idea that a specific pharmacological, neural, or genetic intervention will consistently yield moral enhancement on a wide scale.²² This is because we cannot confidently state that each individual's cognitive and affective systems will be identically impacted by an intervention. The system that underlies moral cognition is unlike

¹⁶ Sharma, E., Mazar, N., Alter, A. L., & Ariely, D. (2014). Financial deprivation selectively shifts moral standards and compromises moral decisions. *Organizational Behavior and Human Decision Processes*, 123(2), 90–100.

¹⁷ Gunia, B. C., Wang, L., Huang, L. I., Wang, J., & Murnighan, J. K. (2012). Contemplation and conversation: Subtle influences on moral decision making. *Academy of Management Journal*, 55(1), 13–33.

¹⁸ Prehn, K., Wartenburger, I., Mériaux, K., Scheibe, C., Goodenough, O. R., Villringer, A., et al. & Heekeren, H. R. (2008). Individual differences in moral judgment competence influence neural correlates of socio-normative judgments. *Social Cognitive and Affective Neuroscience*, 3(1), 33–46.

¹⁹ Edelstein, W., Keller, M., & Schröder, E. (2014). Child development and social structure: A longitudinal study of individual differences. Paul B. Baltes/David L. Featherman/Richard M. Lerner: *Life-span development and behavior*. 10, 151–185.

²⁰ Svensson, R., Pauwels, L. J., Weerman, F. M., & Bruinsma, G. J. (2016). Explaining individual changes in moral values and moral emotions among adolescent boys and girls: A fixed-effects analysis. *European Journal of Criminology*, 1477370816649626.

²¹ Decety, J., & Howard, L. H. (2013). The role of affect in the neuro-development of morality. *Child Development Perspectives*, 7(1), 49–54, 49.

²² Wiseman, H. (2016). *The myth of the moral brain: the limits of moral enhancement*. MIT Press.

216 the serotonin reuptake system which can be predictably modulated by
217 an appropriate intervention.
218
219

220 **3. The cognitive-affective conception of moral dispositions** 221

222 If moral cognition is a domain-general, higher-order, dynamic
223 faculty, influenced by a variety of non-moral factors, then it is also
224 difficult to accept the existence of permanent moral traits. People
225 are not morally good, morally bad, honest, or cowardly, and so on,
226 except in particular situations. If that is true, then moral enhance-
227 ment should not aim at improving moral traits, but other, more
228 general faculties or at improving the environment itself. Limiting
229 situational factors that contribute to immoral behaviour may be the
230 best way towards moral enhancement.

231 This line of thinking is advanced in the situationist challenge to the
232 existence of moral virtues.^{23,24} Situationists rely on evidence from
233 cognitive and social psychology, citing experiments that show our
234 judgments and behaviours come under the influence of unconscious
235 processes and situational factors.²⁵ Mark Alfano created a taxonomy
236 of the kinds of factors that interfere with moral judgment and behav-
237 iour: “bad reasons, situational non-reasons, and non-moral individ-
238 ual differences” and identifies situational non-reasons as the most
239 troubling for the existence of moral character traits.²⁶ These are
240 factors like ambient smells, sounds, and mood.²⁷ This evidence
241 undermines the vision of a thoughtful moral reasoner weighing her
242 options and also seems to undermine the classic virtue ethics
243 picture of the individual’s virtues responsible for consistent behav-
244 iour across a range of situations.

245 On the other hand, there is also a growing body of research cri-
246 tiquing situationism and the situationist interpretation of the relevant
247

248
249 ²³ Harman, G. (2009). Skepticism about character traits. *The Journal of*
250 *Ethics*, 13(2–3), 235–242.

251 ²⁴ Doris, J. M. (2002). *Lack of character: Personality and moral behav-*
252 *iour*. Cambridge University Press.

253 ²⁵ Anderson, C. A., Deuser, W. E., & DeNeve, K. M. (1995). Hot tem-
254 peratures, hostile affect, hostile cognition, and arousal: Tests of a general
255 model of affective aggression. *Personality and Social Psychology Bulletin*,
21(5), 434–448.

256 ²⁶ Alfano, M. (2013). *Character as moral fiction*. Cambridge University
257 Press. Chicago, 40.

258 ²⁷ Alfano, 44–46.

259 experiments.²⁸ The upshot of this research can be simplified as
 260 follows. Firstly, some people, even under external pressure or condi-
 261 tions which tend to stimulate immoral acts, choose the action consid-
 262 ered moral nonetheless. Secondly, moral dispositions shouldn't be
 263 understood merely in behavioural terms, that is, as behaviour that
 264 is recurrent in a specific type of situation. Instead, moral dispositions
 265 should be understood as abilities that allow the individual to interpret
 266 and to adapt to situations in appropriate ways.

267 Drawing similar conclusions, Snow²⁹, Russell³⁰, and Natasza
 268 Szutta³¹ advocate a theory of moral traits as a subset of personality
 269 traits in the cognitive-affective personality system (CAPS).³² CAPS
 270 characterises personality traits as dispositions that are the effect of lon-
 271 gitudinal interactions between endogenous factors (mood, beliefs, etc.)
 272 and exogenous factors (situation, context, etc.). On this view, disposi-
 273 tions are constitutive parts of one's personality and mediate interaction
 274 with exogenous factors. One's personality traits are expressed in the
 275 constant interaction of individual and situational factors, where that
 276 expression exhibits relatively stable patterns of behaviour across
 277 situations.

278 Szutta (2015) argues that CAPS accords with the observation that
 279 most people are relatively consistent in their behaviour, if we take into
 280 consideration their distinctive cognitive-affective system and the way

281
 282 ²⁸ Arjoon, S. (2007). Ethical decision-making: A case for the triple font
 283 theory. *Journal of Business Ethics*, 71(4), 395–410; Wielenberg, E. J. (2006).
 284 Saving character. *Ethical Theory and Moral Practice*, 9(4), 461–491;
 285 Kupperman, J. J. (2001). The indispensability of character. *Philosophy*,
 286 76(02), 239–250; Kamtekar, R. (2004). Situationism and virtue ethics on
 287 the content of our character. *Ethics*, 114(3), 458–491; Radcliffe,
 288 E. S. (2010). "Moral Naturalism and the Possibility of Making Ourselves
 289 Better." In *Moral Cultivation: Essays on the Development of Character and*
 290 *Virtue*, Wilburn, B. K. (Ed.) Rowman & Littlefield, 101–24; Sabini, J., &
 291 Silver, M. (2005). Lack of character? Situationism critiqued. *Ethics*,
 292 115(3), 535–562; Sreenivasan, G. (2013). The situationist critique of
 293 virtue ethics. In *The Cambridge Companion to Virtue Ethics*, Russell,
 294 D. C. (Ed.). Cambridge University Press, 290.

295 ²⁹ Snow, N. E. (2010). *Virtue as social intelligence: An empirically*
 296 *grounded theory*. Routledge.

297 ³⁰ Russell, Daniel C. (2009) *Practical intelligence and the virtues*. Oxford
 298 University Press, 2009.

299 ³¹ Szutta, N., & Szutta, A. (Eds.). (2015). *W poszukiwaniu moralnego*
 300 *charakteru* (Vol. 1). Wydawnictwo Academicum.

301 ³² Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory
 of personality: reconceptualizing situations, dispositions, dynamics, and in-
 variance in personality structure. *Psychological review*, 102(2), 246–268

302 they construe their own situation. For example, consider the case of
303 imposter syndrome.³³ Kate, a hypothetical woman suffering from
304 it, is an intelligent person, but also extremely insecure. She was
305 often criticised by her parents as a child and young adult, and her
306 society discriminates against women. From the perspective of an ex-
307 ternal observer, it appears that Kate does not have much to say. But
308 when we learn about her past and her fears, it becomes difficult to
309 view her behaviour in the same way: now we know she suffers from
310 imposter syndrome, which can be understood as a trait. Attributing
311 this trait to Kate allows us to make better sense of her behaviour
312 and make better predictions about her.

313 Generalising, personality traits can be characterised by ‘If...
314 then...’ profiles of behaviour, which are relatively stable, but situ-
315 ationally dependent. Just as we can say solubility in water is a prop-
316 erty of salt, we can call the relatively stable patterns of human
317 moral behaviour traits, without having to say much about what un-
318 derlies them. When human behaviour is inconsistent (as it often
319 is), the trait remains. This consistent with Snow who argues that
320 “...social-cognitivists stress the importance that the meanings of si-
321 tuations have for people, and claim that evidence of personality co-
322 herence can be found by paying attention to those meanings”.³⁴

323 Returning to Kate, consider the following generalisation about her:
324 when she is around people who she thinks will criticise her and
325 threaten her sense of security, her characteristic way of reacting in
326 these situations will be activated, and she will stay silent. However,
327 when she feels comfortable, for example, among her close friends,
328 she is not afraid to give her opinion, because there is nothing that trig-
329 gers her insecurity. Nonetheless, her imposter syndrome remains.

330 So much is suggested by the one of the original Mischel and Shoda
331 experiments that grounds CAPS. The experiment, conducted at a
332 residential summer camp for children, investigated, among other
333 things, the situations in which specific behaviours occur. Their aim
334 was to capture psychological features, such as the subject’s attitude
335 toward specific circumstances, that triggered the behaviour. They ob-
336 served the children’s behaviours “on selected dimensions (e.g., verbal
337 aggression, withdrawal, friendly, prosocial behaviour) and then made
338 predictions about patterns in children’s behaviour, based on an
339

340 ³³ Kolligian Jr, John, and Robert J. Sternberg. Perceived Fraudulence
341 in Young Adults: Is There an ‘Imposter Syndrome’?. *Journal of personality*
342 *assessment* 56.2 (1991): 308–326.

343 ³⁴ Snow, N. E. (2010). *Virtue as social intelligence: An empirically*
344 *grounded theory*. Routledge., 38.

345 individual “profile of situation-behaviour relationships.”³⁵ These
346 profiles were accurate predictors of the ways children reacted in
347 various situations. Their behavioural responses depended on the
348 child’s interpretation of their situation and were consistent with
349 their ‘if...then...’ patterns of reacting.

350 These sorts of results demonstrate that making generalisations about
351 patterns of behaviour by attributing traits has significant predictive
352 power. In the same way, before we knew the chemical composition
353 of salt, we could still predict how it would ‘behave’ by attributing to
354 it a certain trait. If salt is put into water and it does not dissolve, this
355 does not mean that salt lacks the relevant trait. The situation may
356 have changed and something may be preventing the trait from expres-
357 sing itself. If we know enough about the situation we may also be able
358 to predict that salt will not dissolve, though we cannot explain why it
359 won’t in terms of the relevant chemical reaction.

360 In similar vein, Snow argues that CAPS captures local personality
361 traits which can be characterised as ‘virtues’ and ‘flaws.’ Further, she
362 argues that personality traits can become more global and can be de-
363 veloped through individual conscious reflection. For example, when
364 Kate realises that she feels very sorry for impoverished children in her
365 town, she can ask herself why she doesn’t have the same feelings
366 toward children in other regions, who are significantly worse off.
367 Resulting from this reflection, she decides to give more attention to
368 the suffering of distant children. She may then notice the common,
369 morally relevant features shared by all suffering children.

370 According to Snow, desirable traits can also be developed by lim-
371 iting related vices. This is corroborated by Patricia Devine and
372 Margo Monteith’s research on methods for decreasing the influ-
373 ence of negative stereotypes in the individual.^{36,37} Their research
374 on the Behavioural Inhibition System makes sense of cases where
375 it is possible to change stereotypical thinking through inhibition
376 of intermediary processes, such as negative thoughts and emotions
377 related to the stereotype. The goal is to stop stereotypical behaviour
378 and let one act with more self-awareness in line with one’s updated
379 beliefs.

381 ³⁵ Mischel, W., & Shoda, Y. (1995), 249.

382 ³⁶ Monteith, M. J., Sherman, J. W., & Devine, P. G. (1998). Suppression
383 as a stereotype control strategy. *Personality and Social Psychology Review*, 2(1),
384 63–82.

385 ³⁷ Devine, P. G., & Monteith, M. J. (1999). “Automaticity and control
386 in stereotyping.” In Chaiken, Shelly and Trope, Yaacov (Eds); *Dual-process*
387 *theories in social psychology*. New York, NY, US: Guilford Press. 339–360.

388 It is easy to generate examples of this practice. For instance,
389 someone who was raised in an environment where one ethnic group
390 was discriminated against, will likely end up with dispositions to be-
391 haviourally express negative stereotypes about this group. However,
392 if Snow is right, she can change her attitude, if she consciously
393 aims to rid herself of stereotypical reactions.

394 Snow refers to these practices as cultivation of moral virtue.
395 Bracketing the notion of virtue, understood as a moral quality of a
396 person, we can treat cultivation as a method of enhancement of
397 traits. Traits can be developed and improved over time with the
398 sort of deliberate practices that Snow suggests, even if we completely
399 abandon the idea of virtues as they feature in context of virtue ethics.

400 Snow also points out that it is possible to develop traits intentionally
401 and automatise moral behaviour though automatic goal-dependent
402 actions; these actions are voluntarily initiated and lead to a definite
403 goal. While the goal activation is unconscious, the reactions themselves
404 are both intelligent and situationally sensitive. Snow connects this re-
405 search to the concept of virtue, but it seems equally justified to connect
406 it to the notion of moral dispositions, as we have used it here.
407 Returning to to Kate, she feels compassion toward poor children and
408 consciously decides to help them. Helping becomes her goal and
409 over time: every time she sees an impoverished child she thinks
410 about how best to help. In other words, she intentionally developed
411 a context-sensitive disposition that eventually becomes automatised.

412 All of these presented ways are good examples of how to make local
413 CAPS traits global, in the sense of expanding the contexts in which
414 they manifest. This process will involve, if this research is right, at
415 least some conscious reflection or deliberate choice of a goal. This
416 is why Snow's proposal, for example, is likely to work best for
417 adults in whom higher cognitive functions as reasoning or cognitive
418 control are more developed, but not for young children, whose ab-
419 stract thinking ability is limited.

420 Snow and Russell use CAPS as a rebuttal to the situationist challenge
421 to virtue ethics and as an example of a new and improved way of talking
422 about moral personality traits, which is consistent with the empirical
423 evidence marshalled by situationists. Their approach is a significant
424 improvement on the classic virtue ethics approach at least in part
425 because it has the benefit of making sense of people acting morally in
426 relatively consistent ways across a variety of situations, while at the
427 same capturing the insight that these traits are highly context sensitive.

428 Their view is also an improvement over the approaches to moral en-
429 hancement open to situationists. A situationist would argue that the
430 way to improve morally would be to change the situations in which

431 people find themselves. In other words, the focus should be on moral
432 technologies that improve the environment and not technologies and
433 interventions that target moral agents and their dispositions or traits.
434 This approach intentionally ignores the idea of stable traits.

435 If CAPS is an improvement on the traditional conceptualisation of
436 traits, we can take advantage of it to find strategies for improvement
437 of the agent. But we take a more cautious approach than the virtue
438 ethicists just mentioned and remain as neutral as possible in their
439 debate with situationists. For us, CAPS is a good guide to the *mechan-*
440 *isms* that are potential candidates for targeted non-invasive methods
441 of moral enhancement.

442 The key to our model is identification of traits (A, B, and C in
443 Figure 1). It should be emphasised that on our view traits are not
444 qualities of the person or virtues in the classical sense. Traits are
445 characterisations of context-sensitive dispositions, which, in turn,
446 are realised in particular individuals in particular ways. This means
447 that, to some extent, they are useful fictions.

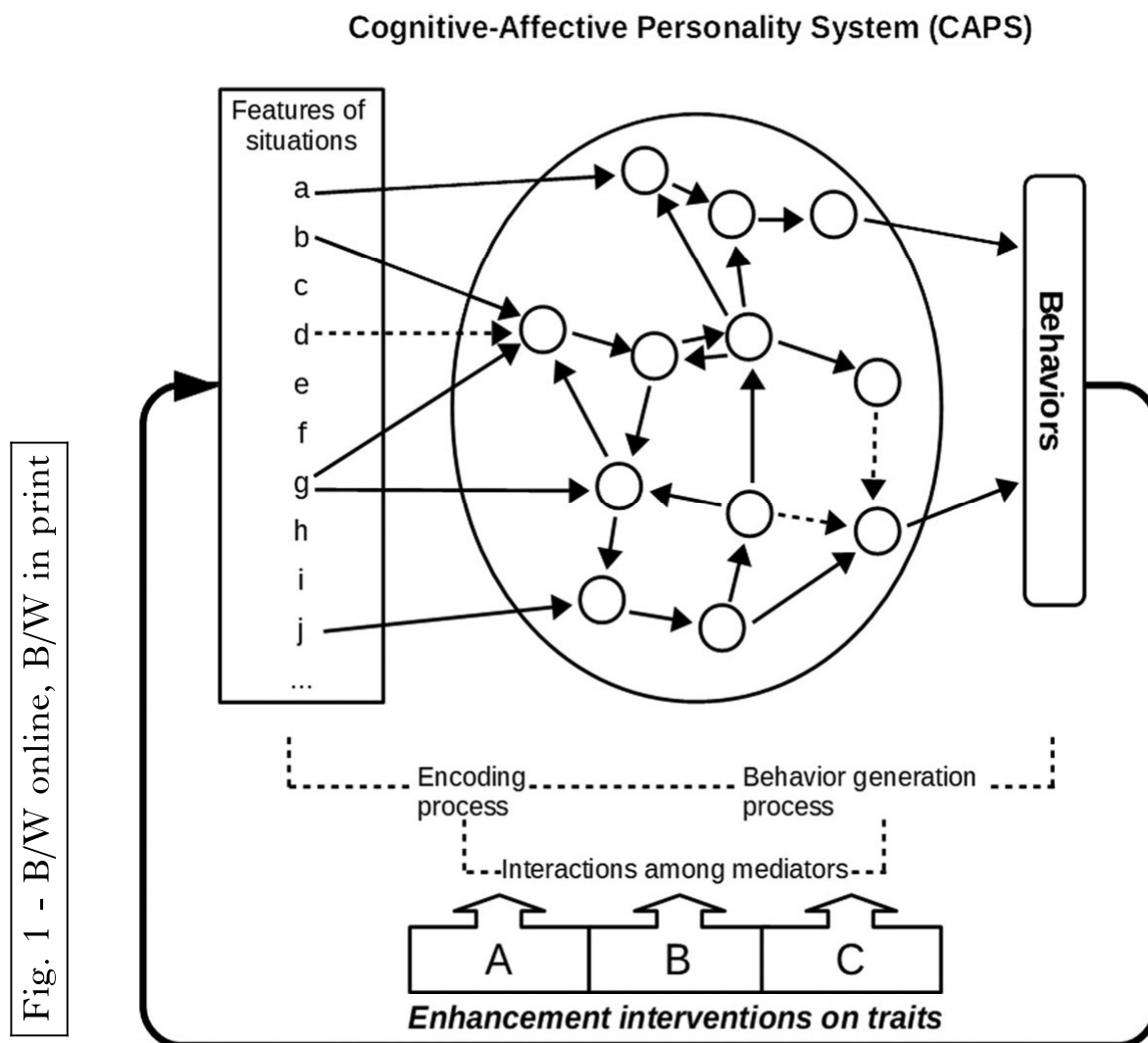
448 However, unlike mere fictions, understanding their complex rela-
449 tionships can tell us a lot about potential non-invasive strategies for
450 individual moral enhancement. On our view, the best non-invasive
451 strategies of enhancement are going to focus on components of
452 moral cognition that are relevant to the realisation of dispositions.
453 Interventions should start early, with child development. This is
454 the first set of strategies we consider.

455 456 457 **4. Child development and moral cognition**

458
459 There are significant differences in the processing of morally-laden
460 stimuli in children and adults. Jean Decety and Lauren Howard's³⁸
461 line of research sheds light on the relationship between particular emo-
462 tions, motivations, and other types of neural activation in people
463 exposed to morally laden stimuli. Their results suggest that affect is
464 key in early development and that higher order cognitive mechanisms,
465 such as cognitive control and response inhibition, have greater influ-
466 ence in adults. This yields an important insight: higher-order cogni-
467 tive abilities have a larger role in adults, whose patterns of processing
468 emotions are different.

469 Supporting this view, Decety and Howard point to research on
470 what may be described as precursors of moral dispositions in
471

472 ³⁸ Decety, J., & Howard, L. H. (2013). The role of affect in the neuro-
473 development of morality. *Child Development Perspectives*, 7(1), 49–54.



500
501
502
503
504
505
506

Figure 1. (Adopted from Mischel and Shoda 1995) Simplified illustration of types of cognitive-affective mediating processes that generate an individual's distinctive behaviour patterns. Non-invasive enhancement interventions on traits A, B, C, aim at strengthening or inhibiting interactions among mediating units, which together comprise a stable network of relations that characterise an individual.

507
508
509
510
511
512
513

infants. In early development affective mechanisms play a key role with relatively little involvement of cognitive mechanisms, which at that time, are under-developed. Bandstra et al. (2011) demonstrate that young children display a much higher level of personal distress when witnessing someone's sadness than older children. Older children display higher levels of sympathy than personal distress.³⁹

514
515
516

³⁹ Bandstra, N. F., Chambers, C. T., McGrath, P. J., & Moore, C. (2011). The behavioural expression of empathy to others' pain versus others' sadness in young children. *Pain*, 152(5), 1074–1082.

517 This is one example, among many, of the ways that development of
 518 aspects of children’s social cognition is connected to the rate of mat-
 519 uration of the prefrontal cortex. Again, it reinforces that moral cogni-
 520 tion is not based on any morally-specific neural structures, but is
 521 rather an integrative cognitive function. It further shows that stimu-
 522 lating moral cognition in children should focus on mediating factors
 523 that are anatomically and functionally different from those that
 524 underlie moral abilities in adults.

525 Furthermore, in young children (4–8 years old) there is stronger
 526 (than in adults) functional connectivity between ventromedial pre-
 527 frontal cortex (vmPFC) and the brainstem, whereas in 18 to 25
 528 year-olds, functional connectivity is stronger between vmPFC and
 529 posterior superior temporal sulcus/amygdala. The idea that emo-
 530 tions play a key role in moral development in the early life is sup-
 531 ported by evidence of greater activation of parts of brain regions
 532 responsible for affect at younger ages. This is corroborated by
 533 lesion studies, which show that early damage to the vmPFC and
 534 amygdala cause much more significant problems in processing
 535 morally-laden stimuli than similar damage later in life.^{40,41} In sum,
 536 this research confirms the platitude that emotional development
 537 early in life is crucial for moral functioning later in life.

538 Caregivers and children’s relation to them play also an important
 539 role in moral development.^{42,43} For example, in families with a
 540 higher level of emotional warmth, children are more altruistic.⁴⁴
 541 Inconsistent child-rearing strategies leads to depression, anxiety,
 542 lowered social abilities, or aggression.⁴⁵ Attitudes of the parents
 543

544 ⁴⁰ Shaw, P., Lawrence, E. J., Radbourne, C., Bramham, J., Polkey,
 545 C. E., & David, A. S. (2004). The impact of early and late damage to the
 546 human amygdala on ‘theory of mind’ reasoning. *Brain*, 127(7), 1535–1548.

547 ⁴¹ Anderson, S. W., Bechara, A., Damasio, H., Tranel, D., & Damasio,
 548 A. R. (1999). Impairment of social and moral behaviour related to early
 549 damage in human prefrontal cortex. *Nature neuroscience*, 2(11), 1032–1037.

550 ⁴² Christen, M., & Narvaez, D. (2012). Moral development in early
 551 childhood is key for moral enhancement. *AJOB Neuroscience*, 3(4), 25–26.

552 ⁴³ Cowell, J. M., & Decety, J. (2015). Precursors to morality in develop-
 553 ment as a complex interplay between neural, socioenvironmental, and be-
 554 havioural facets. *Proceedings of the National Academy of Sciences*, 112(41),
 12657–12662.

555 ⁴⁴ Brody, G. H., & Shaffer, D. R. (1982). Contributions of parents and
 556 peers to children’s moral socialisation. *Developmental Review*, 2(1), 31–75.

557 ⁴⁵ Schore, A. 2011. Bowlby’s “Environment of evolutionary adapted-
 558 ness”: Recent studies on the interpersonal neurobiology of attachment and
 559 emotional development. In D. Narvaez, J. Panksepp, A. Schore, and

560 and their engagement and reactivity to their child's behaviour, help
561 develop a sense of conscience, and result in a higher likelihood of
562 the child developing proper moral attitudes.

563 There are also practices that may help in development of particular
564 traits: breastfeeding for empathy, immediate response to the child's
565 needs for conscience, touch for control of one's behaviour, letting
566 the mother stay with the child right after birth for self-regulation,
567 play for lowering aggression, and parental support for resistance to
568 stress⁴⁶. Additionally parental attitudes and values play an important
569 role because of the attitudes they convey to the child. Overall, value
570 transmission from parent to child seem to be the effect of complex
571 interaction.

572 None of the processes that have an effect on a child's personality
573 development is likely to occur in isolation from others and is probably
574 best understood as biology and environment dynamically interacting.
575 On the one hand, innate emotional and cognitive predispositions are
576 important in some models of interaction between the parent and the
577 child. On the other hand, the environment is equally important.
578 Relevant work done on moral technologies, technologies for behav-
579 iour change, nudges, etc. is useful. In sum, unlike direct, biomedical
580 methods of moral enhancement, those grounded in education and
581 early-life shaping of moral attitudes and their character allows for a
582 more nuanced and individualised approach.

583 584 **5. Non-invasive methods of moral enhancement in adults and** 585 **older children**

586
587
588 Targeted moral improvement in adults by non-invasive means can
589 take many forms.⁴⁷ One particularly promising method focuses on af-
590 fective perspective taking, sometimes considered to be constitutive of
591 empathy.⁴⁸ One strategy for improving affective perspective taking is
592 reading fiction, which increases the ability to understand others'
593

594
595
596 T. Gleason (Eds.) *Human nature, early experience and the environment of*
597 *evolutionary adaptedness*, New York: Oxford University Press.

598 ⁴⁶ Christen, M., & Narvaez, D. (2012), 25.

599 ⁴⁷ For example: Narvaez, D., & Bock, T. (2014). Developing ethical
600 expertise and moral personalities. *Handbook of moral and character education*,
601 140–158.

602 ⁴⁸ Decety, J., & Cowell, J. M. (2014). The complex relation between
morality and empathy. *Trends in cognitive sciences*, 18(7), 337–339.

603 mental states and increases empathic concern.⁴⁹ The mediating
 604 mechanism that underlies development of these traits is likely to be
 605 ToM.⁵⁰ Reading is an effective part of programs aimed at promoting
 606 social skills, treating personality disorders, and increasing empathy
 607 among groups ranging from prisoners to medical students and physi-
 608 cians.⁵¹ In prisons the role of books in improving ToM skills can have
 609 significant impact on inmates' rehabilitation. At the same time other
 610 art-forms, such as films and theatre, may similarly facilitate empathy
 611 and identification with the experiences of others.^{52,53}

612 Another possible non-invasive method of moral enhancement is
 613 Forum Theatre - a version of the Theatre of the Oppressed.⁵⁴ In
 614 Forum Theatre the play is always presented twice - the first time to
 615 show 'anti-model', which embodies the morally, politically, or so-
 616 cially problematic and oppressive state of affairs and the second
 617 time to give the audience an opportunity to react and intervene.
 618 Audience members can stop the performance and present their own
 619 solution to the conflict presented on stage.

620 What is crucial in Forum Theatre is that the division between the
 621 audience and the performers is partially erased. The spectators can at
 622

623 ⁴⁹ Carr, D. (2005). 'On the contribution of literature and the arts to the
 624 educational cultivation of moral virtue, feeling and emotion.' *Journal of*
 625 *Moral Education*, 34(2), 137–151; Johnson, D. R., Cushman, G. K.,
 626 Borden, L. A., & McCune, M. S. (2013). 'Potentiating empathic growth:
 627 Generating imagery while reading fiction increases empathy and prosocial
 628 behaviour.' *Psychology of Aesthetics, Creativity, and the Arts*, 7(3), 306

629 ⁵⁰ Kidd, D. C., & Castano, E. (2013). 'Reading literary fiction improves
 630 theory of mind.' *Science*, 342(6156), 377–380.

631 ⁵¹ Billington, J. (2011). 'Reading for Life': Prison Reading Groups in
 632 Practice and Theory. *Critical Survey*, 23(3), 67–85; Billington, J.,
 633 Longden, E., & Robinson, J. (2016). 'A literature-based intervention for
 634 women prisoners: preliminary findings.' *International Journal of Prisoner*
 635 *Health*, 12(4); Shapiro, J. F. (2007). "Using literature and the arts to
 636 develop empathy in medical students." In Farrow, FTD and Woodruff, P
 (Eds.) *Empathy in Mental Illness*. Cambridge University Press.

637 ⁵² Reilly, J. M., Trial, J., Piver, D. E., & Schaff, P. B. (2012). 'Using
 638 theater to increase empathy training in medical students.' *Journal for*
 639 *Learning through the Arts: A Research Journal on Arts Integration in*
 640 *Schools and Communities*, 8(1).

641 ⁵³ Eisenberg, A., Rosenthal, S., & Schlüssel, Y. R. (2015). 'Medicine as
 642 a performing art: what we can learn about empathic communication from
 643 theater arts.' *Academic Medicine*, 90(3), 272–276.

644 ⁵⁴ Boal, Augusto. "Theatre of the Oppressed, trans." *Charles*
 645 *A. McBride and Maria-Odilia Leal McBride (New York: Theatre*
Communication Group, 1985) (1979): 144–45.

any point become the actors, replacing an actor currently on stage.⁵⁵
The audience is invited to engage in affective perspective-taking.
They are asked to broaden their point of view and consequently
their concern for other, sometimes very different, people.

Forum Theatre has been shown to be very effective in developing
the relevant attitudes towards victims of sexual assault in an empirical
study on 561 students, which

showed that the participants exposed to [a Forum Theatre] per-
formance, in comparison to a sexual assault lecture and a control
group, reported greater perceived self-efficacy in: perspective
taking, emotional contagion, empathic concern, and comforting
behavior toward potential sexually assault survivors.⁵⁶

Extensive evaluation studies in other domains are not available, but it
seems reasonable to expect that being involved in a scene, and becom-
ing an oppressed character on stage may trigger the relevant mechan-
ism of perspective taking in general. This rate of success likely
generalises to other domains from issues of sexual assault.

The other capacity that can be influenced through Forum Theatre
is an ability to notice morally relevant problems in daily life and to
react in the best possible ways. Again, it is important to emphasise
that this method was not evaluated scientifically, however its form
suggests that it could be an appropriate tool for enhancement of par-
ticular components of moral cognition. It is also safe to assume that
this method can be modified to focus on specific moral problems,
such as environmental degradation or global poverty.

There is some reason to think that stimulating empathy inhibits ag-
gressive behaviours and elicits altruism.⁵⁷ This idea has been success-
fully applied in childhood education⁵⁸ and in prison rehabilitation
programs.⁵⁹ In some classrooms, for instance, children care for and

⁵⁵ <http://theforumproject.org/whatistoforumtheatre/>.

⁵⁶ Rodríguez, J. I., et al. (2006). "Assessing the Impact of Augusto Boal's "Proactive Performance": An Embodied Approach for Cultivating Prosocial Responses to Sexual Assault." *Text and Performance Quarterly* 26(3), 245.

⁵⁷ Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and emotion*, 14(2), 107–130.

⁵⁸ Daly, B., & Suggs, S. (2010). Teachers' experiences with humane education and animals in the elementary classroom: implications for empathy development. *Journal of Moral Education*, 39(1), 101–112.

⁵⁹ Kohl, R., & Wenner, A. (2012). State Comparison of Life Sentenced Inmates. Massachusetts Department of Correction, Office of Strategic Planning and Research.

689 interact with a pet, encouraging them develop a sense of responsibility
 690 for the creature's well-being. When pets are also subjects of discussion
 691 empathy for the animals is stimulated.⁶⁰

692 In a growing number of prison programs inmates have an oppor-
 693 tunity to care for an animal: for example, service dog training.⁶¹ In
 694 the Wild Horse Inmate Program,⁶² supervised prisoners, train and
 695 gently break wild horses. The bond this creates with a horse increases
 696 the inmates' empathic concern and sense of responsibility, in addition
 697 to giving them practical skills.⁶³

698 One reason to think that animals are useful in moral development
 699 programs, is evidence that many overlapping brain-regions are acti-
 700 vated while looking pictures of humans *and* animals in distress.⁶⁴
 701 Creating and maintaining a relationship with an animal positively
 702 affects the development of empathy in children.⁶⁵ This confirms
 703 the link between aggressive behaviours toward animals in childhood
 704 and similar behaviours toward other people later in life.⁶⁶ Aggression
 705 levels are negatively correlated with empathy levels, so that a person
 706 with a higher level of empathy will be less inclined to hurt others.⁶⁷

707
 708 ⁶⁰ Daly & Suggs, 'Teachers' experiences with humane education and
 709 animals in the elementary classroom: implications for empathy develop-
 710 ment,' 105–106.

711 ⁶¹ Deaton, C. (2005). 'Humanizing prisons with animals: A closer look
 712 at "cell dogs" and horse programs in correctional institutions.' *Journal of*
 713 *correctional education*, 46–62.

714 ⁶² <https://www.coloradoci.com/serviceproviders/whip/>

715 ⁶³ <https://aci.az.gov/wild-horse-program/>

716 ⁶⁴ Franklin Jr, R. G., Nelson, A. J., Baker, M., Beeney, J. E., Vescio,
 717 T. K., Lenz-Watson, A., & Adams Jr, R. B. (2013). 'Neural responses to
 718 perceiving suffering in humans and animals.' *Social neuroscience*, 8(3),
 217–227.

719 ⁶⁵ Kelly L. Thompson and Eleonora Gullone (2003). Thompson &
 720 Gullone (2003) and Daly & Suggs (2010) refer to the project of *humane edu-*
 721 *cation* which focuses on issues such as social justice and citizenship and
 722 which is meant to encourage people to respect and be compassionate
 723 toward all beings – human and nonhumans and to take into consideration
 724 environment and its welfare. However, the benefits of using pets, presented
 725 by mentioned authors make it interesting method also for moral education,
 726 which are not directly connected to *humane education* in its original
 727 presentation.

728 ⁶⁶ Robin, M., & Bensel, R. T. (1985). 'Pets and the socialization of chil-
 729 dren.' *Marriage & Family Review*, 8(3–4), 63–78.

730 ⁶⁷ Miller, P. A., & Eisenberg, N. (1988). 'The relation of empathy to ag-
 731 gressive and externalizing/antisocial behaviour.' *Psychological bulletin*,
 103(3), 324. Chicago

732 There is also evidence of the impact that interaction with an animal
733 has on emotional development and empathic concern.⁶⁸ Most tea-
734 chers who had classes incorporating animals observed higher levels
735 of empathy and faster socio-emotional development.⁶⁹ However,
736 there is no systematic research on the effectiveness of animal use in
737 rehabilitation programs.⁷⁰ What we have is anecdotal evidence from
738 prison staff and inmates, who are overwhelmingly positive about
739 using animals as components of rehabilitation.
740

741 742 *6.1. Objections and replies: cognitive demands*

743
744 One should note that Russell, Szutta, and Snow's application of the
745 CAPS system to moral traits has been subject to various criticisms,⁷¹
746 to which virtue ethicists responded.⁷² The debate is by no means
747 over. Since we do not adopt an interpretation of traits as moral
748 virtues, but merely treat traits guides to an individual's components
749 of moral cognition, we will not address these objections here, save one
750 concerning self-control and integrity, raised by Laura Papish.⁷³

751 Papish points out that a central ingredient in Snow's account of the
752 development of virtue is the claim that humans desire internal mental
753 and emotional consistency in moral and non-moral matters, yet it is
754 not obvious that people actually have such a desire. Our ability to
755 act in ways that are inconsistent with our values is evident even in
756

757
758 ⁶⁸ Thompson, K. L., & Gullone, E. (2003). 'Promotion of empathy and
759 prosocial behaviour in children through humane education.' *Australian
760 Psychologist*, 38(3), 175–182.

761 ⁶⁹ Daly, B., & Suggs, S. (2010). 'Teachers' experiences with humane
762 education and animals in the elementary classroom: implications for
763 empathy development.' *Journal of Moral Education*, 39(1), 101–112.

764 ⁷⁰ Kohl, R., & Wenner, A. (2012). 'State Comparison of Life Sentenced
765 Inmates.' Massachusetts Department of Correction, Office of Strategic
766 Planning and Research.

767 ⁷¹ Alfano, M. (2013). Russell, D., Review: *Practical Intelligence and the
768 Virtues* and Snow, N., *Virtue as Social Intelligence: An Empirically
769 Grounded Theory. Ethical Theory and Moral Practice*, 16: 671–673; Miller,
770 C. (2016). 'Does the CAPS Model Improve Our Understanding of
771 Personality and Character?' in J. Webber and A. Masala (eds), *From
772 Personality to Virtue*. Oxford: Oxford University Press, 155–185.

773 ⁷² West, R. (2017). 'Virtue Ethics is Empirically Adequate: A Defense
774 of the CAPS Response to Situationism.' *Pacific Philosophical Quarterly*.

⁷³ Papish, (2016) 'CAPS Psychology and the Empirical Adequacy of
Aristotelian Virtue Ethics,' *Ethical Theory and Moral Practice*. 537–549

775 participants of the Milgram experiment who report being very dis-
776 turbed and distressed by their own behaviour as they shocked the
777 learners. Our everyday experiences of inner moral conflict also
778 suggest that we are actually fairly comfortable maintaining moral
779 conflicts. If that is the case, then any theory that assumes that we
780 aim at coherent moral integration in our moral lives depends on a
781 questionable assumption about moral psychology.

782 Furthermore, suppose that we do value integration and that we are
783 capable of achieving it, contrary to evidence that we do not and that
784 we often cannot. If so, then we would move towards a morally praise-
785 worthy personality trait (or virtue) only if we revise and integrate it in
786 the right way. For example, we choose to try to rid ourselves of nega-
787 tive stereotypes rather than the egalitarian values with which they
788 conflict. This also means, as Papish points out, that we have to
789 count on people holding some set of morally right beliefs in the
790 first place. Unfortunately, this may be an unreasonable assumption
791 about anyone and difficult to verify, even if true.

792 This line of objection is relevant to our use of the CAPS model to
793 inform indirect moral enhancement methods in the following ways: 1)
794 if we do not strive for integrated moral personalities, then some of the
795 methods suggested may not be effective and 2) if we do strive for in-
796 tegrated moral personalities, then moral enhancement will depend on
797 individuals holding at least some morally right beliefs to begin with
798 and working towards an integration with those, which we cannot
799 depend on happening.

800 Our first response is to concede to point (1). Conscious self-reflection
801 and a motivation to have a consistent moral personality are prerequisites
802 for strategies initiated by the individual, as in the case of Kate who holds
803 stereotypes. These are unlikely to work without conscious self-reflection
804 and the relevant motivation. However, we further point out that these
805 methods explicitly endorsed by Snow and others are not a part of all
806 the indirect methods we suggest.

807 Early childhood interventions, participatory theatre, reading fiction,
808 and animal therapy, as well do not demand conscious self-reflection on
809 one's moral beliefs or a motivation to have an integrated moral person-
810 ality. Instead, these methods focus on the mediating mechanisms that
811 underlie moral dispositions. For example, on developing the capacity to
812 take the perspective of others through enactment in Forum Theatre or
813 on developing empathic concern by gentle breaking horses. Engaging
814 in these practices morally enhances an individual indirectly, by improv-
815 ing capacities that underlie moral cognition in general.

816 This still leaves point (2) which suggests some limits to our pro-
817 posal that Papish's objections bring into relief. Indirect methods

818 are unlikely to be effective in changing moral dispositions of people
819 with personalities constituted mostly by traits that dispose them to
820 act immorally. This is perhaps also why it is good to be cautious
821 about the standalone potential of indirect methods. The most suc-
822 cessful moral enhancement program would include the widest pos-
823 sible range of techniques, including indirect methods, but also
824 potentially, pharmacological, neural, and genetic interventions.
825

826 827 *6.2. Objections and replies: identifying mediating mechanisms*

828

829 On our view, names of moral traits are understood to be useful short-
830 hand labels for underlying moral dispositions realised by a complex
831 interplay of cognitive and affective mechanisms. Indirect moral en-
832 hancement targets psychological and biological mechanisms that
833 underlie those dispositions. This creates an epistemic problem for
834 our view: it is not clear how to determine when and why particular
835 mechanisms should be targeted.

836 The glib answer to this objection is: it depends. The serious answer
837 is twofold. First, there are ways to categorise groups that can help de-
838 termine the appropriate target for an indirect intervention. Second,
839 there are also ways to account for relevant individual differences in
840 moral cognition.

841 Some group selection criteria were already mentioned in this
842 paper. For example, children below a certain age will be ideal
843 targets for interventions that focus on affect and processing of affect-
844 ive stimuli. Adults may be better suited for strategies that rely on con-
845 scious self-reflection. People with particular personalities are
846 potential target groups.⁷⁴ Particularly useful here may be research
847 into personality traits that compose the so-called Dark Triad,
848 which underlies much of what is typically considered immoral behav-
849 iour.⁷⁵ Individuals can also be distinguished from one another based
850 on aspects of their personality, elements of their cognition, or even
851 features of their learning styles.⁷⁶
852

853 ⁷⁴ Caspi, Avshalom, et al. "Personality Differences Predict Health-risk
854 Behaviours in Young Adulthood." *Journal of Personality and Social
855 Psychology* 73.5 (1997): 1052–1063.

856 ⁷⁵ Bertl, Bianca, et al. "More or less than the sum of its parts? Mapping
857 the Dark Triad of personality onto a single Dark Core." *Personality and
858 Individual Differences* 114 (2017): 140–144.

859 ⁷⁶ Bjorklund, David F., and Kayla B. Causey. *Children's thinking:
860 Cognitive development and individual differences*. SAGE Publications, 2017.

861 This goes some way in answering the objection, but nowhere close
862 to fully. Group differences and individual differences in context of
863 moral cognition, with an eye to biological and cognitive mechanisms,
864 are not typically studied in context of possible interventions.
865 However, this information is not impossible to get in principle and
866 nothing stands in the way of this research being carried out.

869 **7. Conclusion**

870
871 Advocates of moral bioenhancement via invasive means aim to find
872 the best interventions, but as they are well aware, existing methods
873 are on their own inadequate and offer only directions for future re-
874 search. There is, for example, some evidence of selective serotonin re-
875 uptake inhibitors (SSRIs) reducing aggressive attitudes and willing
876 to cooperate for common goals and also evidence of oxytocin increas-
877 ing in-group trust and competence in ToM tasks.⁷⁷ Such methods
878 carry with them side-effects, which differ across individuals.
879 SSRIs, for example, may weaken episodic and long-term memory
880 performance and oxytocin may lower the performance of the amyg-
881 dala and lower fear-responses to potentially dangerous stimuli.

882 It could turn out that indirect methods, such as those we discuss here,
883 are more effective than moral bioenhancement. But if we are serious
884 about moral enhancement, we should consider all possible interven-
885 tions, even the direct ones. Whatever problems moral bioenhancement
886 may have, it may become more effective if supplemented with indirect
887 methods. Looking forward, the idea that we can morally improve and
888 enhance individuals by indirect methods with an eye to biological
889 factors leaves much room for exploration and experimentation.

890
891
892
893
894
895
896
897
898
899
900 ⁷⁷ De Jongh, R., Bolt, I., Schermer, M., & Olivier, B. (2008). Botox for
901 the brain: enhancement of cognition, mood and pro-social behaviour and
902 blunting of unwanted memories. *Neuroscience & biobehavioral reviews*,
903 32(4), 760–776.