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Predictive Processing: A Common Mechanism for Learning in Coaching Practice

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Abstract

Coaching is a well-established practice. Yet given the many different approaches bearing the label coaching, all claiming to be at least as effective as the others, scholars and practitioners are left struggling to come up with a common conceptual framework. Here I propose that coaching approaches are united by a single learning mechanism to which we are all subject. Predictive Processing (PP) is an emerging theory of brain functioning which explains how humans learn by making and correcting 'prediction errors.' Since all coaching involves learning, working with this mechanism, whether explicitly or implicitly, is a key element in how coaching helps clients to achieve their aims. By expanding the common ground for dialogue between followers of different traditions, I hope it can contribute to the development of a more coherent theoretical foundation for coaching. By explaining the principles of PP and how they are reflected in models of learning and coaching practice, I also hope to show how they can help refine and deepen practitioners' understanding of how coaching works.

Keywords: predictive processing, generative model, prediction error, learning, coaching, supervision.

Introduction

In the absence of external reward, babies and scientists and others explore their world. Using some sort of adaptive predictive world model, they improve their ability to answer questions such as what happens if I do this or that? (Schmidhuber, 2006, p.1)

What is coaching? With over 100,000 practitioners worldwide expected to generate \$7.21 billion in 2025 (Zhou 2025), it is clearly a recognised activity. Yet with many seemingly distinct approaches claiming to be effective at doing similar things, scholars and practitioners struggle to agree on a common concept of coaching. The result is "the potential for confusion particularly for novices and for users of coaching" (Cox et al, 2024, p1.), not to mention for the coaching practitioners themselves. Referring specifically to organisational coaching practices, Bachkirova & Borrington (2019) assert that coaching's lack of a coherent philosophical and theoretical foundation prevents it from being considered a recognised discipline.

At its heart, coaching is a bespoke intervention whereby the coach helps clients to identify and learn the actions and behaviours that will enable them to develop their capabilities and achieve their contracted aims. Predictive Processing (PP), an emerging neuroscientific theory of brain functioning, explains how the underlying neurological mechanism for learning is based on the identification and resolution of 'prediction errors.' Here I propose that, as a common factor which connects all coaching interventions, PP can make a valuable contribution to coaching's theoretical foundations and provide common ground for dialogue between followers of different traditions.

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I include a basic, non-computational explanation of the predictive process, including the role of the generative model; the part that prediction error plays in learning and change; the role of attunement in developing shared narratives; and ways of enhancing PP capability. I examine the extent to which PP principles are reflected in, and can extend our understanding of, models of learning and coaching practice.

Predictive Processing: Learning by Prediction, Trial and Error

While the idea of the predictive brain has been around at least since the 18th century, neuroscience research over the last 20 years has taken it to a new level. Predictive Processing is an influential theory of brain function which seeks to explain how we learn, adapt and survive in an ever-changing world. It is a corollary of Karl Friston's Free Energy principle, which in essence states that to ensure their survival, all organisms must minimise uncertainty (Friston, 2010). In humans, the brain does this by having an internal, 'generative' model of everything it has ever experienced, which it uses to predict the 'best-fit' action or behaviour needed to enable us to deal with the situations we encounter with the minimum possibility of error. PP's proponents make the ambitious claim that it provides an over-arching explanation of human behaviour which is comprehensive, explaining all aspects of human cognition; unified, in that it is based on a single algorithm; and complete, effectively covering everything from molecule to meaning (Sprevak, 2024).

Kolb's four-stage experiential learning cycle represents the process of learning as experiencing, reflecting, analysing, and then acting to apply new knowledge. In contrast, PP puts action before reflection and analysis. On perceiving a new situation, the brain rapidly searches through the generative model for past situations that it most closely resembles, along with information about how we dealt with them. Guided by our sense of how we want the new situation to turn out, the brain predicts the best-fit action or behaviour, and we act on it. We then check to see what happened. If the outcome is as expected, the prediction is confirmed. If not – if we make a prediction error – this triggers the learning that will correct the error. We must either (a) accept the new situation and change our prediction accordingly, or (b) change the situation so that the prediction is confirmed. To minimise the possibility of error in the future, we then update the generative model to keep it aligned with its environment (Parr, 2022).

The vast majority of prediction errors are dealt with outside consciousness as part of "an ongoing storm of predictions and corrections" (Barrett, 2017, p. 62). We become conscious of them only when the error is big enough to cause an emotional reaction – surprise, followed by other emotions depending on nature of the error, such as disappointment or shame, or joy and delight. The scale of the reaction depends on another important aspect of PP theory: the weighting, or degree of certainty, we give to a given prediction. In coaching, asking clients and supervisees to keep track of such emotional reactions can highlight prediction errors that are the trigger for learning.

The Generative Model

In PP theory, predictions of future action are informed by the brain's continually evolving generative model of our inner and outer worlds. The model is an active store of prior beliefs, values, biases, predispositions and associated actions and behaviours from the accumulated

observed outcomes of our experience from before birth (James, 2010) to the present moment. It is 'generative' in that it can generalise from experience in an earlier situation to generate new, original predictions in later, unfamiliar situations.

Our genetic inheritance provides us with the neural networks needed to make predictions and the drive to use them to find patterns in, and make sense of, our environment. But the subsequent growth and content of the generative model is profoundly influenced by the nature and qualities of the environment to which we are exposed. The greater our range of relevant experience, the more likely it is that in any given situation we will have encountered something similar on which to base our predictions.

While the external senses keep the generative model informed about the outer world, much of its input comes from our extensive internal sensory-motor neural networks including the interoceptive, proprioceptive and skeletomotor systems that keep it in touch with and responsive to what is going on in the body. The idea of the triune brain, where the cortex is seen as a later addition to the reptilian and then mammalian brain, is being displaced in favour of the integrated brain, where all its components have evolved and grown together; our feelings directly influence our cortically-generated predictions and hence our thoughts and actions (Barrett, 2017). The generative model is key to our sense of self. Indeed, it might be said that in one sense, we are our generative model. This underlines the value of a whole-person approach to learning and change in coaching practice.

Learning from Prediction Error

We keep our generative model up to date by probing our environment in a never-ending action/check feedback loop, forever predicting and taking action, checking if the outcome is as expected, and updating it if we make a prediction error. "By trying (and failing) to predict the world, we can learn to do better, until our predictions succeed." (Clark 2023, p 27). In the case of consciously experienced prediction errors, some learning may be through insight alone, e.g. the 'Aha' moment as in the Mooney image of an apparently random array of black splodges turns into a Dalmatian. More complex learning requires reflection, either in the moment or subsequently.

Friston asserts that "habits can be learned simply by observing one's own [belief-based] goal-directed behaviour...an inevitable consequence of equipping agents with the hypothesis that habits are sufficient to attain goals" (Friston et al, 2016, p.863). Given that our beliefs determine what we consider to be the optimal behaviour in each situation, this implies that for a client to learn from a prediction error, coaches must help them to address the dysfunctional beliefs and assumptions that gave rise to it in order to re-direct their behaviour and develop the new habits needed to achieve their aims. Just as with learning to drive a car, learning any new skill involves a period of trial and error to refine it along with frequent repetition to embed it in the generative model.

One way of actively stimulating our learning is deliberately to move out of our 'comfort zone' into 'stretch' situations where we are more likely to make prediction errors. This might seem counter-intuitive: if we are to minimise the potential for error, should we not keep our activity as error-free as possible? Yet the world is continually changing, and we must not only keep up, but work to enhance our ability to make accurate predictions. In the longer term, this will reduce error more than if we play safe.

This explains our natural instinct to be curious and novelty-seeking (Friston, 2017). The brain's reward system reflects this: it tracks our prediction error rate against how well we expect to do and, if the outcomes are better than expected, triggers dopamine release (Starkweather, 2017). This makes us feel good and, along with other neurotransmitters, motivates us to keep going, as in Csikszentmihalyi's 'flow' state (Ulrich, 2014). Without it, we are more likely to give up. Even when we are studying, we do it to learn things which will help us reduce or avoid the chance of making mistakes in the future. All such experiences deepen our expertise by enriching the generative model and improving our predictions in life and work.

The skill is in choosing situations which are "neither too predictable nor too unpredictable" (Clark, 2023, p.93). In coaching, such situations may be implicit in the coaching aims; or the coach might explore suitable challenges with the client. In sports settings, coaches can introduce unexpected elements in practice to help athletes adjust their predictions and improve their adaptability.

Chronic Prediction Error

One reason why our predictions may turn out to be wrong is because, while they served us at the time they originated, the situation has changed. For example, if an infant discovers that their mother or primary carer persistently fails for whatever reason to soothe them when they become distressed, they learn to find ways of soothing themselves. As adults, this can lead to a high degree of self-reliance, along with a wariness of others which can lead to problems when forming relationships – what is known as an 'avoidant' attachment pattern (Mikulincer & Shaver, 2016). Their ingrained belief is that they cannot trust people to give them help, so they are afraid to ask for it when they need it.

In coaching, this can emerge as the 'reluctant delegator.' The client fails to experience their behaviour as being related to a prediction error because it has become habitual, often rationalised as 'they won't be able to do it to the standard required/as well as me,' or 'it's quicker to do it myself.' The certainty (high prediction weighting) of their belief leads to a "chronic prediction error" (Holmes, 2020, p. 59). A key skill for coaching practitioners is the ability to help the client become aware of and process such hidden errors, which can often constitute significant obstacles to progress.

A note of caution. What constitutes a dysfunctional belief may not always be obvious. While most coaches will agree that it is legitimate to address issues such as a reluctance to delegate, many beliefs, biases and prejudices are socially and culturally determined, differing from culture to culture and from generation to generation. The difficulties this can present is illustrated by the challenges experienced in trying to establish diversity, equality and inclusion in our workplaces. How the practitioner works with beliefs that may clash with their own requires a well-developed ethical sensibility.

Shared Narrative in Coaching Dialogue

As highly social beings, most of our sensations arise from verbal and non-verbal interactions with others. Our ability to communicate with others is vital to our survival and wellbeing – and to a successful coaching intervention. Understanding the role PP plays in making this work can help us communicate more effectively.

In any conversation, we are either a listener or a speaker. Listening is an active process, encompassing the full range of sensory experience involved in any dialogue. In PP terms, this involves not only the words, but the speaker's tone and quality of voice, body language, how they look and so on, along with our own awareness of the context and of our interoceptive activity, engaging our generative model to prepare a response to what they are saying. When it is our turn to speak, we enact our predicted response which will, we hope, add to and extend the narrative. We learn to take turns because we cannot easily speak and listen at the same time. In fact, to help us sustain what is a highly complex activity, the speaker's awareness of their sensory input is dialled down ('sensory attenuation') – an explanation, perhaps, of why the person speaking in a webinar breakout room tends to keep talking even as the room is closed down.

However, there is a catch. When you are speaking, I will be using my generative model to make sense of and predict what you are saying; when I am speaking, you will be using yours to do the same with me. But while I am trying to make sense of what you are saying right now, I need to take into account how that has been affected by the sense you made of what I have just said, which in turn is affected by what you said the last time you spoke.... leading to an infinite regression, like the endless images in facing mirrors. Friston and Frith's (2015) answer is that, rather than relying on our respective generative models operating separately, they become synchronised through sensory exchange ("an inevitable and emergent property of coupling two systems that are trying to predict each other" (Friston & Frith, 2015, conclusion).

Just as two people can become entrained physiologically when speaking together, their generative models become attuned to one another leading to the development of a single, shared narrative which, crucially, exists separately from either of them. An analogy is the way a jazz musician picks up on and further develops a theme introduced by the previous player, all within the same overall, implicit structure – a musical experience co-created by and yet separate from the individuals involved. "By interchanging roles, participants learn *both* to listen and to act and are thus liberated from being trapped in fixed positions [i.e. the certainties of a chronic prediction error]" (Holmes, 2020, p 59, italics in original).

This need for attunement can explain why coaching practice places such emphasis on building a strong working alliance between practitioner and client (Graßmann et al, 2019; Molyn et al, 2020; Stelter, 2019), and why the client's 'propensity to relate' is a critical factor in doing so (De Haan 2019). It is hard to attune to and create a shared narrative with someone who does not want to engage, where trust is lacking, or who is simply distracted or stressed. It underlines the value to both client and practitioner of taking time at the beginning of each session to share how they are feeling, and explains why some practitioners invite clients to take a few calming breaths. It also explains how a skilled practitioner can steer the narrative on behalf of the client: they "maintain focus on the [contracted aims], while temporarily going along with and tracking the client's deviations and distractions" (Holmes, 2020, p. 140). To do this, they need sufficient awareness of themselves and the client to ensure they do so in a collaborative rather than a coercive way.

The ability to stay in the shared narrative can be a challenge, especially for inexperienced or student coaches who come from high-power executive roles, where directing others and providing advice has been central to their function. Instead of working to internalise the coaching axiom that the coach's aim is to empower the client and help them find their own solutions, such coaches tend to find themselves predicting and offering actions which will solve the client's problem for them, thereby breaking off the narrative. This can be countered by staying curious and engaging with the client from a place of genuine 'not-knowing' – an ability that can be developed though mindfulness practice (see below).

Models of Learning

Early in the last century, the pragmatist philosopher John Dewey's process of Inquiry anticipated the nature of a prediction error as a state of 'perplexity, doubt due to being in a situation, whose full character is undetermined.' The inquiry process went on to determine the nature of the error in the context of the situation which gave rise to it before identifying and implementing the best-fit corrective action and checking whether it produced the expected outcome (Bachkirova & Borrington, 2019).

This section will explore the implications of PP theory for our understanding of five models of learning familiar to coaching practitioners: Mezirow's 'Transformative Learning'; Kline's 'Time to Think'; Keegan and Lacy's 'Immunity to Change'; the 4 Stages of Competence model; and Dweck's 'Mindset' model.

1. Transformative Learning

Mezirow's model starts with the 'disorienting dilemma', which he defined as 'a pivotal personal crisis or life event that challenges an individual's existing beliefs, assumptions, and perspectives' (Mezirow, 1981). In PP terms, this is an extreme form of prediction error, which demands a substantive reorganisation of the generative model. Having identified the dilemma, Mezirow settled on several further 'phases of transformation.' These cover both the need to change the prediction by accepting what has happened (self-examination; checking assumptions); a willingness to change the situation to match the desired outcome (explore new actions; create and be ready to try out a plan; develop, refine and become more confident of new behaviours needed to implement it) and a determination to update their generative model (integrate new behaviours into their lives).

2. Time to Think

Unlike Mezirow's approach, where the prediction error is overt at the outset, clients may come with a sense of dissatisfaction with their lives or work, or a desire to improve things, without having experienced the moment of surprise that typically signals a prediction error. Kline's approach takes account of such chronic prediction errors by surfacing what she refers to as the 'limiting assumption.' During extensive exploration, she remains alert to what might be the assumption at the root of the issues the client wants to address, and then uses carefully constructed, seemingly simple but powerful questions to help the client surface and free themselves of their limiting assumption/prediction error (Kline, 1999).

Kline emphasises the importance of establishing a Thinking Environment, which requires equality, listening with respect and without interruption, and showing appreciation – ideal conditions for attunement and beginning a shared narrative. She adds that the Thinking Partner should resist telling the client how, in effect, to change and update their generative model. Instead, they should steer the narrative in a way that empowers the client to work out and own any changes for themselves, and so have the best chance of those changes being accepted into what is effectively the client's sense of self.

The need for the 'Thinking Environment' also recognises that to change the generative model can be a tough process for the client, particularly if it involves long-standing 'bedrock' beliefs. It can trigger feelings of vulnerability, fear, guilt or shame. The client must not only have good reason to change, but must actively want and be able to, as expressed through their propensity to relate mentioned above, and their 'resilience' (De Haan, 2019). The practitioner must in turn provide an appropriately 'safe space' (with the caveat that they stay alert to the possible need for referral to specialist therapeutic support). Without it, the aim helping the client adapt their generative model in service of their goals is unlikely to be achieved.

3. Immunity to Change

This approach aims to address a mismatch "between the world's complexity *and our own at this moment*" (Keegan & Lahey 2009, p. 12, italics in original), i.e. a generative model which is not aligned with the realities of its environment. The growth of 'mental complexity' is represented as a progression from the instinct for conformity of the socialised mind, through the focused, authoritative drive of the self-authoring mind to the broader and more flexible vision of the self-transforming mind. From a PP perspective, this progression could be seen as the increasing sophistication and refinement of the ability to notice and respond creatively to prediction error. The 'Big Assumptions' surfaced by the Immunity to Change process can, like Kline's limiting assumptions, be seen as powerful dysfunctional beliefs that have been preventing the individual from doing so. Again, by making them explicit, the associated chronic prediction errors come to light and can be processed.

Keegan and Lahey point out that this is not just a cognitive exercise. As in PP, "changing the mindset needs to involve the head and the heart" (Keegan & Lahey, 2009, p. 318). They also emphasise that in dealing with a Big Assumption, insight is not enough; change in mindset must be combined with change in behaviour (ibid., pp 218-219) to achieve what is effectively a significant reshaping of the generative model.

4. The Four Stages of Competency Model

Consciously developing the generative model involves encountering, recognising and resolving prediction errors. The Four Stages of Competency Model, most frequently attributed to Noel Burch of Gordon Training International in the 1970s, exemplifies this process.

The four stages are: Unconscious Incompetence (I don't know what I don't know); Conscious Incompetence (I know what I don't know); Conscious Competence (I know that I can do it now); and Unconscious Competence (I can do it without thinking about it). A fifth stage has been proposed: Reflective Competence, where we actively reflect on and refine our unconscious competence, either alone or with others. Figure 1 below illustrates how we move between these different stages. We gain in competence through training, practice and reflection until we achieve unconscious competence, embodied in the generative model. When we make an error, this draws us back towards conscious incompetence. As we learn from the error, our competence increases again. Regularly repeating this sequence by moving into the stretch zone discussed above enables us to deepen and refine our overall expertise.



Probability of achieving predicted outcome

Figure 1. Prediction Error in the Four Stages of Competency Model showing how individuals can deepen and refine their expertise by deliberately rotating through the stages.

The Competency Model can help us understand how professional intuition develops. Intuition in PP can be thought of as our experience of the generative model's prediction as it unfolds in a given situation. When we catch a ball, we intuitively know where to move our hand to catch it; and the more we practice, the better our intuition becomes. The expertise of a coach who has delivered 500 hours of coaching is likely to be greater than one who has delivered 50 hours. But for complex activities, it takes more than putting in the hours. Remember the apocryphal candidate for a teaching job who claimed to have 20 years of experience, countered by the interviewer saying, no, you've had one year of experience repeated 20 times? We learn not just by having experiences, but by reflecting on those experiences.

We can also learn by reflecting on what went right – those practices that have emerged through the unconscious processing of prediction errors. Hence the proposal for a fifth stage to

the model, Reflective Competence. Here we reflect on the nature of the beliefs and behaviours that underpin our unconscious competence and consistently lead to positive outcomes. What did we do, how did we do it, could we do even better? What were we not doing? Is there anything more we need to do to keep our generative model up to date with current understanding and performance of coaching and supervision practices? What is our direction of travel in the never-ending journey towards mastery – what is our longer-term prediction about how we will be in the future? All questions relevant to supervision.

5. Mindset Theory

According to Dweck (2012), people holding a growth mindset believe their abilities can change with practice, while people with a fixed mindset believe that their abilities cannot be changed. PP helps us understand the willingness to change as a balance between our responsiveness to prediction error, and our level of certainty about how accurate a given prediction was in the first place.



Figure 2. Willingness to Learn: Predictive Processing as applied to Mindset Theory. In this graph, those with a fixed mindset will tend to remain in the bottom right-hand corner while those with a growth mindset will move flexibly across the field depending on the situation.

In this context, someone with a growth mindset is likely to be both open to noticing and acting on prediction error, and pragmatic, being more willing consciously to question just how certain they can be of their prediction. This allows them to respond effectively to changes in their environment and to plan what they can do to avoid prediction error in an imagined future scenario. Yet when they need to, they can also have a high degree of conviction that allows them to achieve things that might not otherwise happen – the power of intention, goals, and determination, a high level of motor control, a sense of 'I can do this.' They can, in effect, move

flexibly around the whole field of the graph in Figure 2 in response to different contexts. They are likely to benefit from what coaching can offer.

Perhaps the most dramatic example of a growth mindset is what might be called 'Aspiration to Mastery' (top right). This is illustrated by the young person, fired up by the idea of helping people, who wants to become a doctor. Yet initially, they are likely to have very little idea of what this involves in practice. So they are driven by the certainty that this is what they will do, and at the same time have a hunger to gain experience, learning by persistently exposing themselves to possible error by putting themselves in unfamiliar, stretch situations.

In contrast, those with a fixed mindset are more likely to feel sufficiently certain, even dogmatic, about their beliefs that they override any prediction error, remaining in the bottom right-hand corner and foregoing the opportunities that having a more flexible mindset – and coaching – can bring.

Developing PP Awareness in Practitioners

Reflection

As noted above, our learning from experience can be enhanced through reflection. By providing an insight into the underlying mechanism, PP helps coaches understand the importance of active reflection both on their own and with a reflective partner, particularly about client experiences which have aroused their feelings, whether pleasant or unpleasant.

Getting to know your Generative Model

Self-awareness is an essential quality in coaches and supervisors. To be self-aware is to be familiar with the over-arching beliefs and values embodied in the generative model that guide our actions in the world. While we may not be therapists, by knowing something of how we came to behave the way we do, we become better able to work constructively with the interpersonal dynamics of the coaching relationship. For a summary of some areas to reflect on, see Table 1.

Category	Influences on Beliefs and Behaviours in the Generative Model
Interpersonal	Interpersonal impact of evolving physical attributes, e.g. height, weight, appearance, gender, colour, health and wellbeing, physical ability Attachment patterns and relationship history
	Attitudes towards others and related emotional triggers
Social/cultural	Family background and culture
	Socio-economic grouping
	Social Media use
Education &	Academic experience and achievement
Learning	Arts activities
	Extracurricular activities incl. hobbies, clubs, pastimes

Table 1. Factors influencing the Generative Model.

Economic and	Early experience of wealth/poverty
Material	Employment history
	Financial resources
	Power, status
Psychological	Self-beliefs, self-awareness, self-knowledge, patterns of reaction under stress.
	Mindset, motivations
	Personality type, Perceived strengths and weaknesses
Philosophy/	Philosophical/Religious/Spiritual beliefs and practices
Ideologies	Ethical and moral stance
	Political beliefs and attitudes

Depending on the nature of the work and the contracted aims, it can also be useful for practitioners to help coachees and particularly supervisees develop their own awareness of relevant aspects of their generative model by reviewing how they see themselves, exploring their beliefs, values, relational experiences, and their sense of how they came to behave as they do, drawing on other people's feedback where appropriate.

Mindfulness & Attention control

Appropriate use of mindfulness practices for those able to adopt them enables us to move down the predictive hierarchy within the brain from the thinking, narrative self towards the felt experience of the sensing, perceiving, embodied self (Laukkonen & Slagter, 2021). This greater interoceptive awareness enables us more readily to attune and develop a shared narrative with clients as described above. It helps us to be more sensitive to what's going on in a meeting beyond the narrative exchange, to better distinguish our experience from that of the client, and to be more aware of our respective prediction errors as they occur. It can also help us refine our attention control, allowing us to be fully present, focusing on what feels most salient at any given moment, avoiding distraction by other preoccupations.

Gaming the Generative Model

If coaching and supervision is about helping the client to make changes to their generative model to better equip them to achieve their aims and purposes, then it is important to understand that the way it works can be exploited by both the client themselves and the coach or supervisor, for example, through the placebo effect, and the use of encouragement (Clark, 2015).

Placebo Effect

In medicine, the placebo effect is well known. It has been demonstrated that when someone is given a sugar pill to ease their pain, even if they are told it is a sugar pill, with the right assurances it can do so. A parallel example from coaching might be helping a client with presentation anxiety. As yet there are no reports of coaches having given clients sugar pills to deal with it, but several other techniques have been used: reframing, self-affirmation, positive self-imagery, empowering self-narrative, ritual, having friendly faces in the audience. These are all ways of helping the client to generate predictions of a successful performance.

Encouragement

Coaches and supervisors can also influence by giving direct encouragement. The question is, how far should they go: evidenced-based ('You've done it before, you can do it again') or further, heart-felt ('I know you can do it!')? This in turn highlights the need for them to be aware more generally of the powerful influence they can have on their clients. While positive regard is important, unsubstantiated assertions can be misleading and may disempower the client through becoming dependent on the practitioner's validation.

PP in Practice

The proposition of this paper is that the process of identifying and processing prediction error can be seen as a basic mechanism common to effective coaching practices. The following generic approach (adapted from Popovic & Jinks, 2014) illustrates how principles of PP discussed above might play out in practice. It is not intended as yet another model of coaching, but for comparison with existing approaches to see how far they draw on PP principles and to highlight opportunities for further refinement.

- 1. Present: 'How I am', helping the client to recognise current generative model-generated patterns of behaviour:
 - a. Authentic listening: providing space for the client to reflect on presenting problems, issues or aspirations and associated thoughts, beliefs, feelings and behaviours while listening for evidence of prediction errors.
 - b. Rebalancing: Through a shared narrative, helping the client make sense of conflicts revealed and surfacing immediate and/or chronic prediction errors.
- 2. Future: 'How I want to be', learning and integrating new patterns of action and behaviour into the generative model in line with aspiration/goals:
 - a. Generating: helping the client to use their prediction errors as a starting point for developing and enacting more constructive beliefs and patterns of thinking and behaviour which eliminate those errors and enable personal growth and achievement.
 - b. Supporting: providing feedback and encouragement. Helping the client to identify resources to establish new patterns and integrate them into their generative model.
- 3. Resources: Awareness of PP, self-understanding, mindful practice and attention control, stretch situations and, where appropriate, a client-driven feedback process from key stakeholders. Use of placebo effect and appropriate encouragement.

The way each theoretical tradition tends to conceptualise its work with clients will affect where it focuses its work with them leading them to pay attention to particular types of prediction error and not others. For example, with dysfunctional behaviours arising from an avoidant attachment pattern (see Chronic Prediction Error, above), a solutions-focused coach is likely to attend to seeking workable solutions rather than first working to understand their origins as a psychodynamically-orientated coach might do. Such differences in focus would help to explain the emergence of integrative coaching models, which draw on ideas from different schools to tailor the coaching to the needs of a particular client. It also explains why many coaches develop their own personal models of coaching drawing in elements from different schools depending on their own life experience, their training and where their journey as a coach has taken them.

Many approaches are adapted and draw inspiration from therapeutic schools, which themselves implicitly embody PP principles. An example of a theory specifically developed for coaching practice is Bachkirova's (2022) theory of developmental coaching, the Development of Self in Action (DSA). Drawing on Dewey's philosophical pragmatism, it anticipates many of the insights that arise from PP theory, including its emphasis on action, the value of making mistakes, reflections on acceptance and change and the concept of the evolving self. Additionally, the role of the elephant in the rider/elephant metaphor reflects the influence of the extensive internal sensory-motor input to the generative model.

From a PP perspective, how far a coach succeeds will depend on how far they are able both to get a feel for the contents of a particular client's generative model in relation to the expressed aims of the coaching, and to help the client identify and deal with the associated prediction errors.

Summary

Predictive Processing provides a theoretical explanation of how learning happens at a neurological level. As such, it provides a unifying concept for different approaches to coaching which could contribute to the development of a common theoretical framework for coaching. Coaches and supervisors with a knowledge of PP can integrate its insights into their practice, with the possibility of more effective client support. They can adopt practices that explicitly challenge and refine both their own and their clients' generative models. This can be accelerated by creating or engaging with stretch situations that increase the chance of learning through prediction errors. PP can help them question their assumptions and consider alternative outcomes, thereby deepening expertise and enhancing decision-making and problem-solving skills, not only helping professional and personal development but also fostering a flexible mindset that is open to new experiences, crucial for growth and fulfilment in life and work.

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