

HANDBOOK OF Advanced Metacognition

*The **LOGic**, **PHYsics**, **DIAlectic** and **RHEToric** of Judgement and Understanding*

*An Open Science Tool from **Neurocomb25 Lab***



Diego Velázquez, *Las Meninas (The Ladies-in-Waiting)*, 1656. Oil on canvas, 318 × 276 cm. Museo Nacional del Prado, Madrid.
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How to Cite This Handbook (APA 7th Edition)

The reference list entry is written as follows: Neurocomb25 Lab. (2026). *Handbook of Advanced Metacognition: An open science tool*. <https://neurocomb25.net>

In text, the parenthetical form reads (Neurocomb25 Lab, 2026), and the narrative form reads, for example, Neurocomb25 Lab (2026) defines Advanced Metacognition as the capacity to judge which brain state a situation requires and to switch into it deliberately. A citation to a specific part of the Handbook can be written as (Neurocomb25 Lab, 2026, Chapter 4), and a direct quotation is introduced in the ordinary way, for instance: Neurocomb25 Lab (2026) describes judgement as “the metacognitive act of recognising which state the moment needs” (Chapter 8).

Where the Handbook's material is adapted for slides, social posts or teaching handouts rather than quoted directly, the attribution line should read: Adapted from Neurocomb25 Lab. (2026). *Handbook of Advanced Metacognition*. <https://neurocomb25.net>. A shorter attribution suitable for social media reads: Source: Neurocomb25 Lab (2026). Handbook of Advanced Metacognition.

This Handbook builds on earlier peer-reviewed work, which should be cited alongside it wherever the bonsai framework itself is discussed: Halchenko, O. (2025). Introducing bonsai thinking: The science of learning, unlearning, and relearning for the age of continuous adaptation. *Blockchain, Artificial Intelligence and Future Research*, 1(2), 48–65.

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1. Purpose and Use

Most accounts of learning describe what to do. Very few describe how to decide which kind of doing the moment actually needs. A person can be told to practise more, to reflect more, or to seek out new experiences, and all three pieces of advice can be true at once without telling that person which one applies right now, in this specific situation, with this specific history behind it. This Handbook addresses that decision directly, treating it not as a matter of temperament or intuition but as a skill that can be named, studied and trained. It is written for coaches, leaders, teachers, researchers and for anyone who carries responsibility for their own development or for the development of other people, and it assumes no prior background in neuroscience, only a willingness to sit with an unfamiliar vocabulary long enough for it to become useful.

As an open science tool, the Handbook is written to be transparent, so that every claim it makes is tied to a named source and every limitation is stated plainly rather than smoothed over, in the chapter given over to that purpose later in the text. It is written to be reusable, so that the protocols and questions gathered in the practitioner's toolkit can be taken up directly in a coaching session, a classroom or a team meeting without further adaptation. It is written to be testable, in that a set of hypotheses is offered for anyone who wishes to examine the framework empirically rather than take it on trust. And it is written, throughout, to be attributed, since the whole notion of an open science source depends on use being traceable back to where it came from, which is the condition set out on the page before this one and repeated at the close of the Handbook.

2. Definitions

Metacognition, in its classical sense, was described by Flavell (1979) as knowledge about one's own cognition together with the active monitoring of one's own cognitive experience as it unfolds. Nelson and Narens (1990) later gave this a more formal shape, describing it as two operations working in a continuous loop: monitoring, which is the ongoing assessment of what one actually knows or how one is actually performing, and control, which is the decision about what to do next on the strength of that assessment. Applied metacognition takes this further still, treating it not as a form of reflection that happens after a task is finished, looking back over what was done, but as a working control system operating in real time, in the middle of the task itself, adjusting course while there is still course to adjust.

Advanced Metacognition, as defined in this Handbook, goes a step beyond even that. It is the capacity to judge which neural-cognitive mode a given situation actually requires, whether that is learning, unlearning or relearning, and then to enter that mode deliberately rather than defaulting to whichever mode is most habitual or most comfortable. This capacity rests on three interlocking skills. The first is noticing, which is the plain recognition of which mode one is currently occupying, since a great deal of misapplied effort comes simply from not knowing which brain is presently in charge. The second is judging, which is the harder skill of deciding which mode the situation actually calls for, independent of habit or preference. And the third is switching, which is the practical work of making the transition between modes, at the right moment, and at a cost the person and the situation can bear. In short, Advanced Metacognition is knowing not only what one thinks, but which brain one needs right now, and having the trained capacity to become that brain.

3. Theoretical Foundations

3.1 The triple network model

Menon (2011) proposed that large-scale brain function can usefully be organised around three interacting networks. The Central Executive Network, generally abbreviated CEN, supports goal-directed attention, working memory and the ongoing self-monitoring of task performance. The Default Mode Network, or DMN, supports self-referential thought, autobiographical memory and the simulation of alternative futures and alternative selves, and is most active precisely when goal-directed attention is not required (Buckner et al., 2008; Andrews-Hanna, 2012). The Salience Network, or SN, anchored in the anterior insula and the dorsal anterior cingulate cortex, detects what is motivationally or emotionally salient in the internal or external environment and helps to switch control between the other two networks (Menon & Uddin, 2010; Sridharan et al., 2008).

3.2 Anti-correlation and switching

A well-established finding in this literature is that the CEN and the DMN typically show opposing patterns of activity: when one is strongly engaged, the other tends to recede into the background, and the Salience Network appears to be implicated in gating the transition between the two (Sridharan et al., 2008). This is not merely a convenient metaphor borrowed from neuroscience for rhetorical effect. It is the empirical basis for the claim, central to this Handbook, that the selection of a cognitive mode is a real and physiologically grounded event, and that like any physiological event it can, with practice, be brought increasingly under deliberate influence.

3.3 Bonsai thinking

Halchenko (2025) introduced bonsai thinking as a framework for understanding the cyclical science of learning, unlearning and relearning, taking the cultivated bonsai tree as a working metaphor for three dimensions of human development. The first dimension is length, corresponding to **life-long learning** and expressed through the practices of watering and fertilising. The second is depth, corresponding to **life-deep learning** and expressed through pruning. The third is width, corresponding to **life-wide learning** and expressed through wiring and positioning, the deliberate placement of the tree in relation to light, gravity and space. This Handbook takes that framework as its starting point and develops its neuroscientific and philosophical foundations in greater depth.

3.4 The mapping used in this Handbook

This Handbook maps each of the three bonsai dimensions onto one of the three large-scale brain networks described above. Learning is mapped onto the CEN, described here as the plastic brain, corresponding to **life-long learning**, to Chronos time, which is sequential and measurable clock time, and to the practices of watering and fertilising, carried out in the manner of an athlete in training. Unlearning is mapped onto the DMN, described here as the synchronised brain, corresponding to **life-deep learning**, to Kairos time, which is the qualitative and opportune moment rather than a measured duration, and to the practice of pruning, which as the following chapter explains may be either deliberately chosen or externally imposed. Relearning is

mapped onto the SN, described here as the engaged brain, corresponding to **life-wide learning**, to Aion time, which is the sustained and encompassing present rather than a single instant, and to the practices of wiring and positioning, supported by what this Handbook calls aesthetic intelligence.

Mode	Network	Brain	Time	Bonsai action
Learning	CEN	Plastic brain	Chronos	Watering, fertilising
Unlearning	DMN	Synchronised brain	Kairos	Pruning (deliberate or imposed)
Relearning	SN	Engaged brain	Aion	Wiring, positioning

3.5 A Stoic architecture

The Stoics divided philosophy into logic, physics and ethics, and divided logic itself further into dialectic and rhetoric (Long & Sedley, 1987), giving four terms that map neatly onto four different ways of examining any single phenomenon. They also held that logos, or reason, has two faces at once: an inner form, which is thought, and an outer form, which is speech, the two being facets of a single rational force rather than separate things. For the Stoics, judgement itself was understood as an act of assent, the yes or no given by the mind to whatever impression presents itself. This Handbook adopts the four-part Stoic structure as a working analytical instrument, applying **LOGic**, **PHYSics**, **DIAlectic** and **RHEToric** to each of the three modes in turn, in the chapter that follows.

4. The Four Lenses: LOGic, PHYsics, DIAlectic, RHEToric

Each of the three modes examined in this Handbook is looked at through the same four lenses in turn, so that the resulting picture of it is complete rather than partial. **LOGic** asks after the rule that orders the mode, its underlying structure and its reasoning. **PHYsics** asks what the mode is materially made of, which body, which brain state and which form of energy it draws upon and depletes. **DIAlectic** asks how the mode moves through opposition, through dialogue and through contradiction, since very little in human development proceeds by smooth, uncontested progression. And **RHEToric** asks how the mode takes expressible form, how it is said, and how it addresses both other people and the person's own inner audience.

Taken together, these four lenses supply a working definition of understanding itself. An idea is genuinely understood, on this account, when it holds together logically, when it is embodied physically rather than merely entertained abstractly, when it survives dialectical opposition rather than collapsing at the first serious challenge, and when it can be rhetorically expressed, put into words that another person, or one's own later self, can actually receive. Where any one of these four tests fails, understanding remains incomplete, however confident the person may feel in the moment.

5. Mode I: Learning (CEN, the Plastic Brain)

In the language of the bonsai, learning is length. It corresponds to the practices of watering, which stands for metacognition, and fertilising, which stands for meta-motivation, and its governing image throughout this Handbook is the athlete in training.

Considered **LOGically**, learning follows the logic of a training plan, in which a skill is decomposed into its component parts, sequenced in a workable order, and overloaded gradually so that capacity increases without breaking down. Ericsson's (2006) account of deliberate practice names the necessary ingredients precisely: clear goals, focused attention, and immediate feedback on performance. The metacognitive element of this process is what distinguishes a champion from an enthusiast, since the champion continuously watches their own performance and measures, with some precision, the gap between what was intended and what was actually achieved.

Considered **PHYsically**, learning rests on plasticity, and plasticity is a material fact about the brain rather than a figure of speech. Repetition physically reshapes synaptic connections, following the principle that neurons which fire together tend to wire together (Hebb, 1949). Like any physical process, learning obeys an athlete's law of load and recovery: too little stimulus and nothing adapts, too much stimulus without recovery and the system breaks down rather than strengthens. Effortful control of the kind the CEN provides is also metabolically costly and it fatigues over the course of a session, which means it has to be spent deliberately, on the things that matter most, rather than wasted on incidental decisions.

Considered **DIAlectically**, learning is a dialogue between performer and monitor, between athlete and coach, even where both roles are held by the same person. Every repetition poses a question, and the result that follows supplies the answer. Retrieval practice works precisely because it allows the material itself to interrogate the learner, and correction functions as the antithesis without which no real progress can be made,

since a learner who cannot be corrected, whether by a coach or by the material itself, cannot in any meaningful sense be trained.

Considered **RHEtorically**, learning is the art of making a skill sayable, of finding the words that let it be rehearsed. Athletes talk to themselves in short, rhythmic, imperative cues, and techniques such as chunking, mnemonics and structured drills are all forms of rhetoric placed in the service of repetition. What can be said crisply can be rehearsed, and what can be rehearsed with sufficient repetition can eventually be automated, freeing conscious attention for whatever comes next.

The characteristic risk of this mode, when it is overused or entered by default rather than by judgement, is what this Handbook calls the CEN-stuck state, in which an increasing amount of effort is poured into a premise that in fact needs to be removed rather than reinforced.

6. Mode II: Unlearning (DMN, the Synchronised Brain)

In the language of the bonsai, unlearning is depth. It corresponds to the practice of pruning, and its governing image is a return to a zero point rather than a gradual fading away. Unlearning, properly understood, is the removal of structures that no longer serve, and it is not the same thing as forgetting, since forgetting is passive decay while unlearning is an active return to an irreducible baseline from which a new structure can then be formed.

6.1 Two kinds of pruning: deliberate and external

Pruning is not always chosen, and this Handbook treats both of its forms as legitimate unlearning rather than privileging one over the other. Deliberate pruning is values-aligned and self-initiated: the practitioner examines a premise, judges that it no longer serves, and removes it on purpose, in service of a shape they have chosen to grow into. In neural terms, this is the CEN stepping back voluntarily so that the DMN can do its work by invitation rather than by force. External or circumstantial pruning, by contrast, is imposed rather than chosen: redundancy, illness, the end of a relationship, the collapse of a market, a forced relocation. The branch is not selected for removal; the storm removes it regardless of what was intended. Mezirow's (1991) own examples of the disorienting dilemma that triggers transformative learning are, on the whole, of exactly this second kind, and Bridges' (2004) model of transitions rests on the identical distinction, observing that an ending can be chosen or it can simply happen, and that either way it opens the same undefined interval, which Bridges calls the neutral zone, before anything new is able to take root.

This distinction changes what agency actually looks like within unlearning. Where pruning is deliberate, the metacognitive skill required is judgement, the work of deciding what ought to be cut and why. Where pruning is external, the metacognitive skill required is instead recognition and integration: noticing that the cut has already taken place, resisting the understandable urge to graft the old branch back on as though nothing had happened, and doing the DMN-mediated work of meaning-making deliberately, even though the removal itself was never the practitioner's own to choose. Advanced Metacognition, applied to a case of external pruning, does not consist of control over the event, which by definition was outside the person's control. It consists instead of control over what is made of the event afterward, which remains within the person's control even when almost nothing else does.

Considered **LOGically**, unlearning follows a logic of subtraction rather than addition. Where learning adds premises, unlearning examines the premises that are already in place. This is what Argyris and Schön (1978) called double-loop learning, which asks not merely whether a task is being done correctly but whether it is the right task to be doing at all. This is difficult precisely because most premises never present themselves to consciousness as premises in the first place; they are simply experienced as the air one breathes, invisible until something forces them into view.

Considered **PHYsically**, unlearning rests on baseline and rest rather than on effort. Because the CEN and the DMN are anti-correlated, unlearning cannot be forced into being by the very network that produced the original learning in the first place; effort, in this mode, is simply the wrong instrument for the job. Incubation, walking, silence and states associated with increased alpha-rhythm activity appear instead to be the right instruments (Strüber et al., 2022). The athlete already understands an equivalent truth in their own domain, since physiological adaptation is consolidated during recovery, and the rest day is when the body actually rewrites itself, not the day of the hardest training session.

Considered **DIAlectically**, unlearning is a dialogue of the self against itself, in which it is not always obvious which voice is speaking: the one who originally learned the premise in question, or the one who has since come to see matters differently. Mezirow's (1991) disorienting dilemma is dialectic made visible, a fact that the old frame simply cannot digest, together with the contradiction that follows from that failure. Socratic questioning is effective in this mode precisely because it does not tell a person what is wrong with their thinking; it instead allows them to discover the contradiction for themselves, which is the only way the discovery actually sticks.

Considered **RHEtorically**, unlearning is the rewriting of an inner narrative. The DMN sustains the ongoing story a person tells about who they are, and in Stoic terms the inner logos must change before the outer logos, the spoken word, ever can. Unlearning, seen this way, is reframing in the fullest sense: the same events, re-described patiently until they no longer bind the person who lived through them.

The characteristic risk of this mode, when it is overused or entered without a clear endpoint, is what this Handbook calls the DMN-stuck state, an endless reflection and rumination that produces no new material and simply circles the same ground indefinitely.

7. Mode III: Relearning (SN, the Engaged Brain)

In the language of the bonsai, relearning is width. It corresponds to the practices of wiring and positioning, and its governing image is the encounter rather than the lesson. Relearning is not re-teaching in the ordinary sense; it is the act of placing the learner in a context in which new perception becomes structurally possible, where it simply was not possible before.

Considered **LOGically**, relearning follows a logic of surprise. In predictive accounts of perception, the brain is constantly generating a standing bet about what the world contains, and a sufficiently large prediction error functions as a premise that refuses to fit the existing model. The Saliency Network is what helps determine which of these errors are actually worth attending to, and this is precisely where what this Handbook calls aesthetic intelligence does its work, the trained sensitivity to what is coherent, novel or genuinely striking rather than merely different. Relearning, on this account, is not re-teaching; it is allowing salience itself to choose what deserves to be updated.

Considered **PHYsically**, salience is felt in the body before it is thought in the mind. The insula integrates bodily signals directly, which is why a salient encounter so often arrives first as a caught breath, an unexplained pause, or a sudden lift in attention, well before any conscious interpretation follows. Relearning also has a physics of placement in the more literal sense: move the bonsai into a new relation with light and with gravity, and every physical force acting upon it changes at once. New environments carry new affordances (Gibson, 1977), and the act of switching between networks itself carries a measurable energetic cost that should not be underestimated.

Considered **DIAlectically**, relearning supplies the third term in a larger movement. If learning is the thesis and unlearning the antithesis, relearning is what mediates between two modes that otherwise suppress one another by their very nature. Here, however, the dialogue is no longer between the self and itself, as it was in unlearning, but between the person and the world they inhabit.

Considered **RHEtorically**, relearning sits on the receiving end of persuasion rather than at its source: it is the art of being addressed. A genuinely salient encounter persuades the body before it persuades the conscious mind. This is why poets defamiliarise their subjects, why designers build deliberate affordances into their objects, and why a painting, a single Polaroid photograph, or a piece of timed writing can reopen a scene that a person had, without quite realising it, stopped seeing altogether. Defamiliarisation (Shklovsky, 1917/1965) names exactly this deliberate technique of making the familiar strange again so that it can actually be perceived rather than merely recognised.

The characteristic risk of this mode, when it is overused or entered as a form of avoidance, is what this Handbook calls the SN-stuck state, a continual pursuit of novelty that never consolidates into anything durable.

8. Judgement: Diagnosing the Stuck Brain

Judgement, as this Handbook uses the term, is the metacognitive act of recognising which state a given moment actually needs, together with the trained capacity to enter that state once it has been recognised.

Understanding, correspondingly, is what remains once a piece of knowledge has been built in the plastic brain, questioned in the synchronised brain, and then re-encountered in the engaged brain, so that it has passed through all three modes rather than resting in only one of them.

Seen through this lens, the three characteristic failure modes described in the preceding chapters become easy to recognise in practice. A person caught in the CEN-stuck state tends to work harder for diminishing returns, to hold to rigid routines even when those routines have plainly stopped working, and to spend their energy defending a method rather than testing it against results; what they most likely need is unlearning. A person caught in the DMN-stuck state tends toward circular thinking, toward long stretches of reflection that never resolve into action, and toward a growing difficulty engaging productively with the outside world; what they most likely need is relearning, a genuine change of context or a fresh encounter of the kind described in the previous chapter. And a person caught in the SN-stuck state tends toward constant novelty-seeking, toward many enthusiastic starts and very few finishes, and toward a conspicuous absence of any real depth of skill in a given domain; what they most likely need is learning, in the disciplined sense of deliberate practice and genuine consolidation.

9. The Practitioner's Toolkit

The tools gathered in this chapter are meant to be used directly, in a coaching session, a classroom, or a quiet moment of self-assessment, rather than studied purely as theory.

9.1 The Three-Question Check

This check takes about two minutes and can be run silently, without any special equipment. The practitioner asks first which brain they are occupying right now, whether that is the plastic, the synchronised or the engaged brain; then asks which brain the present situation actually requires, independent of habit; and finally asks what the smallest possible action would be that could begin the switch from the first state toward the second.

9.2 Watering Protocol (CEN)

This protocol begins by setting one specific and measurable goal for the session at hand, and then, before beginning, predicting what the result of that session is likely to be. The practitioner then performs the task with full attention for a fixed block of time, and afterward compares the actual result against the earlier prediction, recording honestly whatever gap emerges between the two. On this basis, a single variable is adjusted before the next block begins, so that the cycle can repeat with a genuine improvement built into it.

9.3 Pruning Protocol (DMN)

This protocol begins by choosing one belief, habit or method that has come to feel entirely automatic, and then writing it down explicitly as a stated premise rather than leaving it implicit. The practitioner then asks where the premise originally came from, what it currently costs to maintain, and what it might be protecting them from having to face. On this basis a decision is made to keep the premise, to modify it, or to prune it outright, and, crucially, a period of rest is allowed, without new input of any kind, before any decision is made about what should replace what has just been removed.

9.4 Wiring Protocol (SN): timed encounters

Timed constraints hold a boundary open long enough to be useful, and they reduce the interference of the internal editor that otherwise smooths experience back into the familiar. Three forms of timed encounter are especially effective: timed painting, in which one bounded sitting is devoted to one subject with no revision permitted afterward; the instant photograph, in which the frame must be decided within seconds and the resulting image is examined immediately rather than at leisure; and timed writing, in which a fixed and short window is set, with no stopping and no correcting allowed until the window closes. In every case, the practitioner should afterward ask what they noticed that they would not otherwise have noticed, since that noticing is the actual product of the exercise.

9.5 Weekly Cycle Template

A simple weekly rhythm can hold all three modes in a sustainable balance. The first three days of the week are given to learning, with two watering blocks scheduled per day. The fourth day is given to unlearning, with a single premise audit conducted in the manner described above, followed by a genuine rest window rather than

an immediate rush to replace what was removed. The fifth and sixth days are given to relearning, through one timed encounter and one deliberate change of context. And the seventh day is given over to judgement itself, in which the Three-Question Check is run and the following week's cycle is planned in light of what the week just past has revealed.

9.6 Coaching Question Bank

For learning, useful questions include what exactly is being practised, how the practitioner will know whether it has worked, and what the feedback so far is actually telling them. For unlearning, useful questions include what is being assumed that has never actually been questioned, what would be lost by letting a given belief go, and what story about the self that belief might be quietly protecting. For relearning, useful questions include what is being noticed now that was not noticed before, where the practitioner might stand in order to see the same situation differently, and what would genuinely come as a surprise in this particular context.

9.7 Reflective Self-Check

A practitioner can rate themselves from one, meaning rarely, to five, meaning consistently, on each of the following statements: I can tell which mode I am currently in; I can name the mode a given situation needs; I can switch modes when it genuinely matters that I do so; I schedule real time for rest; I actively seek out encounters that might surprise me; and I deliberately question my own premises rather than waiting for circumstance to question them for me. This is offered as a reflective tool for practice and for teaching, and it should be understood clearly as exactly that rather than mistaken for a validated psychometric instrument.

10. An Image of the Three Brains: Velázquez



Velázquez, D. (1656). *Las Meninas* [Oil painting, 318 × 276 cm]. Museo Nacional del Prado, Madrid, Spain.

Few paintings hold all three brains within a single frame as clearly as this one does. Velázquez stands at his easel with brush and palette in hand, looking directly out at the viewer, the practitioner caught in the very act of monitoring his own work, which is the plastic brain rendered visible. At the back of the room, a small mirror reflects the king and queen, who stand outside the painted space entirely, in a position that mirrors our own as viewers; it is an image of something that cannot be seen directly, an inward reflection folded into the picture itself, which is the synchronised brain rendered visible. Further back still, a figure stands in an open doorway, one hand resting on the curtain, lit brightly against the darker room behind, and the eye keeps returning to that brightest point in the whole composition, the threshold that leads to the world beyond the studio, which is the engaged brain rendered visible. This reading is offered as one interpretation among the many the painting has invited over more than three and a half centuries, and what matters for the purposes of this Handbook is simply that all three modes coexist within a single frame, and that the picture, in its own quiet way, looks directly back at whoever is looking at it, making it a painting about the very act of seeing oneself see.

11. Limits, Cautions and Open Questions

The three-network mapping offered throughout this Handbook is a conceptual framework rather than a literal claim that any given activity is confined to the operation of a single network in isolation. Real cognition, at every moment, involves all three networks working together in some proportion, and the mapping is a tool for thinking clearly about emphasis, not a claim about exclusivity. The neuroscience cited throughout describes patterns observed at the level of groups in controlled studies, and it does not amount to a method for measuring which state any particular individual is in at any particular moment. This Handbook is offered as an educational and developmental tool, and it is not a clinical intervention, nor is it any substitute for medical or

psychological care where such care is needed. Any research into brain stimulation referenced in the wider literature this Handbook draws upon concerns controlled laboratory settings exclusively, and none of it should be read as a recommendation for self-administered stimulation of any kind.

Several hypotheses arising from this framework are offered here for the wider research community to take up and test rather than simply accept. It is proposed that practitioners trained in the Three-Question Check will show faster and more appropriate mode-switching on structured tasks than untrained comparison groups. It is proposed that rest windows following a premise audit will improve the quality of subsequent cognitive restructuring, compared with an immediate rush to replace what has just been removed. It is proposed that timed encounters of the kind described in the practitioner's toolkit will increase the measurable novelty of ideas produced, relative to untimed equivalents attempting the same task. And it is proposed that the reflective self-check offered in the same chapter could, with appropriate psychometric development, be built into a fully validated instrument. Researchers who take up any of these questions are asked, in the spirit of open science with which this Handbook begins, both to cite the Handbook and to share whatever results they obtain openly in turn.

12. Training in This Method

A handbook can describe a method with as much precision as language allows, but Advanced Metacognition, like any applied skill, is ultimately learned by doing it under supervision, with feedback, and in the company of other practitioners working through the same material at the same time. Reading about the plastic, synchronised and engaged brain is not the same activity as learning to feel, in the middle of an actual coaching conversation, which of the three a client currently occupies, and reading about the distinction between deliberate and external pruning is not the same activity as sitting with a client whose pruning was entirely external and unchosen, and helping them do the integration work that follows.

For this reason, those who wish to be trained formally in this method, and to be equipped to work with their own clients using it, rather than simply to understand it as theory, can complete Neurocomb25 Lab's ICF CCE-accredited certification course, built specifically around the Learning, Unlearning and Relearning cycle this Handbook sets out. The course takes the conceptual material given here, the four lenses, the three modes, the practitioner's toolkit and the distinction between deliberate and external pruning among it, and turns it into practised, supervised, coachable skill, delivered under the Trilogy of Education, which draws together neuroscience, happiness studies and future studies, and structured according to Neurocomb25 Lab's own 3D Format. Because it carries International Coaching Federation Continuing Coach Education accreditation, it also counts directly toward the ongoing professional requirements that practising coaches are already expected to maintain, so that training in this specific method also serves the practitioner's broader credential.

The certification is deliberately kept to a small cohort, so that supervision and feedback remain genuinely personal rather than diluted across a large group, and it is offered live and online so that practitioners anywhere can take part without travel. Full details of enrolment, scheduling and cohort dates are maintained at neurocomb25.net, and enquiries are welcomed from coaches, leaders, teachers and anyone else who works developmentally with other people and wishes to bring the judgement described in this Handbook into that work in a disciplined and accredited way.

13. Glossary

Advanced Metacognition: the capacity to notice, judge and switch between learning, unlearning and relearning modes.

Plastic brain (CEN): the mode of goal-directed learning and self-monitoring.

Synchronised brain (DMN): the mode of reflective, self-referential unlearning.

Engaged brain (SN): the mode of salience detection, switching and relearning.

Chronos, Kairos, Aion: sequential time, opportune time, and sustained encompassing time, respectively.

Pruning: the removal of structures that no longer serve, whether deliberate and self-initiated or external and imposed by circumstance.

Neutral zone: the undefined interval after an ending, whether chosen or imposed, and before a new beginning is able to take root (Bridges, 2004).

Wiring and positioning: the deliberate placement of the learner in a new context.

Zero point: the irreducible baseline to which a system returns in the course of complete unlearning.

Defamiliarisation: the deliberate technique of making the familiar strange again in order to restore genuine perception of it.

14. References and Authorship

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This Handbook was written by Aleksandra (Oleksandra) Halchenko for **Neurocomb25 Lab**, building on her earlier peer-reviewed introduction of bonsai thinking (Halchenko, 2025) and on her development of the Advanced Metacognition framework set out in full in the chapters above. Those wishing to train formally in this method, and to work with their own clients using it under ICF CCE accreditation, are directed to the certification course described in Chapter 12.

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