

The Railway Analogy: Understanding the Brain as a Dynamic Network

In neurodiversity-affirming practice, one of the most persistent challenges is unlearning the idea that the brain is a machine that can be fixed, optimised, or disciplined into uniform performance. Many traditional explanations of neuroscience rely on mechanical metaphors, broken parts, faulty wiring, or deficits that must be corrected. While these metaphors may appear intuitive, they often reinforce moral judgement, pathologising language, and unrealistic expectations of consistency.

The Railway Analogy offers a more accurate, humane, and strengths-based way of understanding how brains function. It moves us away from a "repair" mindset and towards the strategic environmental management advocated in frameworks like Lane Anthony's Dynamic Development Plan (DDP).

Rather than imagining the brain as an engine with a single output, the railway analogy frames it as a complex transport network, made up of multiple routes, stations, speeds, signals, and priorities. Some lines are fast and efficient, others slower or more sensitive to disruption. Importantly, no two railway networks are identical, and variation does not imply failure.

Moving Beyond the "Broken Brain" Model

A common misconception in neuroscience education is the belief that differences in attention, memory, emotional regulation, or task initiation represent faults in the system. This often leads to statements such as:

- "They just need more discipline."
- "If they can do it once, they should always be able to do it."
- "They are capable, they just are not trying."

The railway analogy directly challenges these assumptions. In a railway system, speed and reliability are route specific. A high-speed express line between two major cities does not imply that every local line will operate at the same pace. Likewise, a delay on one route does not indicate that the entire network is dysfunctional.

In neurodivergent brains, certain neural pathways may be highly efficient, fast, and well-resourced, while others require more energy, external support, or favourable conditions to activate. This is not laziness, lack of effort, or poor character. It is neurology interacting with context.

Mapping the Network: The Four Areas of Need

To fully utilise this analogy within an educational or coaching setting, we can map the railway infrastructure against the four broad areas of need, a structure central to the UK SEND Code of Practice and Lane Anthony's DDP.

1. The Tracks and Routes (Cognition and Learning)

Neurotypical development often assumes a standard gauge track where all trains run at similar speeds. The neurodivergent network, however, is specialised.

- **Express Lines:** These are the areas of hyper-focus and deep interest. Here, information travels instantly, and processing is exceptionally high-level.
- **Maintenance-Heavy Lines:** These routes may have steeper gradients or older infrastructure (e.g., working memory or processing speed for non-preferred tasks). Running heavy traffic here causes delays, not because the driver is unwilling, but because the infrastructure imposes a physical limit.

2. The Signalling System (Communication and Interaction)

Signals tell the train when to go, stop, or change tracks. In a neurodivergent brain, the signalling system (social communication and pragmatics) may operate on different frequencies.

- **Misinterpreted Signals:** If a neurotypical "signal" is subtle (non-verbal), the neurodivergent driver might not see it, leading to a collision or a sudden emergency stop.
- **Signal Jamming:** In high-pressure social environments, the sheer number of signals can overwhelm the control room, leading to a shutdown of the line to prevent accidents.

3. The Power Supply (Sensory and Physical Needs)

Every train needs fuel or electricity.

- **Voltage Spikes:** Sensory overwhelm is akin to a power surge that blows the fuses. The trains stop running not because they are broken, but because the safety breakers have tripped to protect the system.
- **Low Voltage:** Under-stimulation can lead to a lack of momentum, where the train simply cannot get up the hill (task initiation) without an external push.

4. Traffic Control (Social, Emotional and Mental Health)

The Traffic Control Centre represents Executive Function.¹ It manages the timetables, prioritises trains, and handles emergencies. In many neurodivergent profiles, the

Control Centre is creative and dynamic but easily overwhelmed by too many simultaneous demands.

Linking to Lane Anthony's DDP

This is where Lane Anthony's Dynamic Development Plan (DDP) becomes vital. If the Railway Analogy describes the *territory*, the DDP provides the *map and strategy*.

The DDP is a strengths-based blueprint. Traditional plans often look at a railway with a steep gradient and say, "This train is defective because it cannot climb the hill fast enough." The DDP, conversely, looks at the network and asks:

1. **Where are the Express Routes?** (Strengths identification). How can we route more cargo (learning/tasks) through these high-efficiency lines?
2. **What infrastructure support is needed?** If a route is slow, do we need a helper engine (scaffolding/TA support), or do we need to reduce the load (differentiation)?
3. **Are we fuelling the system correctly?** (Sensory regulation).

Lane Anthony's DDP encourages educators and leaders to stop blaming the train for the track layout. Instead, it mandates a collaborative effort to engineer a timetable that suits the specific network.

Understanding Variability Without Moral Judgement

Another widespread misunderstanding is the idea that ability should be consistent across time and situations. When learners or clients perform well one day and struggle the next, this is often interpreted as inconsistency of effort.

The railway analogy reframes this entirely. Rail networks are affected by:

- Traffic load
- Signal congestion
- Maintenance demands
- Weather conditions
- Competing priorities

Similarly, neural functioning is influenced by sensory load, emotional state, cognitive demand, motivation, sleep, stress, and environment. A route that runs smoothly under low load may slow dramatically when demand increases. This does not mean the route has disappeared, only that conditions have changed.

For neurodivergent individuals, this explains why a task may be achievable in one context but inaccessible in another.

Strengths Are Not Compensation, They Are Core Routes

Traditional deficit models often treat strengths as compensations for weaknesses—something that “makes up for” a lack elsewhere. The railway analogy rejects this framing.

In many neurodivergent profiles, certain routes are not merely functional but exceptionally efficient. These may include creativity, pattern recognition, deep focus on areas of interest, emotional insight, or systems thinking.² These express routes are not accidents, nor are they secondary traits. They are core features of the network.

Effective coaching, aligned with the DDP, does not attempt to reroute all traffic through slower lines simply to meet normative expectations. Instead, it asks how existing express routes can be used intentionally, ethically, and sustainably.

Correcting Common Misconceptions Through the Analogy

The railway analogy helps dismantle several persistent myths:

- **Executive function difficulties are not laziness.**³ They reflect how and when certain routes activate, often in relation to dopamine, novelty, or meaning (the fuel mix).
- **Emotional overwhelm is not overreaction.** It reflects genuine physiological activation within the network, particularly when sensory or emotional load exceeds the capacity of the current track.
- **Routine alone does not fix neurological differences.** Rigid systems fail when they do not align with how the specific network's signalling operates.
- **Memory challenges are not a lack of care.** Working memory capacity varies by route and load, not by intention.
- **Teaching people to “behave normally” is not support.** Forcing all traffic through unfamiliar, unmaintained routes increases breakdown, burnout, and masking.

Applying the Railway Analogy in Coaching Practice

For coaches and educators, the value of the railway analogy lies not in explanation alone, but in how it reshapes decision-making. When working with a client, a

neurodiversity-informed coach uses the analogy to guide observation and inquiry rather than judgement.

This includes:

- **Noticing energy expenditure:** Which activities run on the 'Express Lines' (energising) and which run on the 'uphill gradients' (effortful)?
- **Contextual analysis:** Exploring when certain tasks become easier or harder, and under what conditions (weather/traffic).
- **Environmental audits:** Identifying where the environment is creating unnecessary congestion or signal failure.
- **Load management:** Designing supports that reduce load rather than increase pressure.
- **Prioritising wellbeing:** Valuing the integrity of the infrastructure over the speed of a single train.

Importantly, the coach does not attempt to redesign the entire network. Instead, they work with what already exists, strengthening routes, adjusting signals, and reducing unnecessary bottlenecks.

From Understanding to Ethical Support

At Level 5, learners are expected to demonstrate that they can translate neuroscience into compassionate, ethical practice. The railway analogy supports this by offering a framework that is explanatory rather than evaluative.

It allows coaches to move away from questions such as:

- “Why can’t they just do it?”
- “How do we make them more consistent?”

And towards questions such as:

- “What conditions allow this route to run more smoothly?”
- “Where is the load coming from?”
- “How can support be introduced without forcing masking or burnout?”

By adopting this lens, coaching shifts from control to collaboration, from correction to context, and from compliance to autonomy.

Concluding Perspective

The railway analogy is not a simplification of neuroscience, but a translation of it. It respects complexity while remaining practical. It validates lived experience without

abandoning rigour. Most importantly, it aligns neuroscience with the core values of neuro-affirming practice: dignity, agency, and sustainability.

For coaches, the task is not to memorise the analogy, but to use it as a way of thinking. When applied thoughtfully, and grounded in frameworks like Lane Anthony's DDP, it becomes a powerful tool for understanding behaviour, designing support, and challenging deficit-based assumptions, without ever reducing the individual to their struggles.

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The Railway Network Map

A Dynamic Development Planning Tool

Purpose

To move away from a "deficit" list and create a functional map of how your unique brain processes information, manages energy, and interacts with the world. This map helps us design a schedule and environment that keeps the trains running safely and efficiently, aligned with the principles of Lane Anthony's Dynamic Development Plan (DDP).

1 The Express Lines (Strengths & Interests)

In the DDP, we start with strengths. These are the routes where the track is perfectly maintained, the train runs fast, and the journey feels effortless.

Reflection:

- **High-Speed Zones:** What activities allow you to focus for hours?
- **Heavy Cargo:** What complex problems can you handle easily?
- **The "Flow" State:** When do you feel most competent?

2 The Maintenance Lines (High Energy Cost)

These are not "broken" lines, but they have steeper gradients or older infrastructure. Running trains here costs more fuel.

Reflection:

- **The Steep Hills:** What tasks drain your battery fastest?
- **Speed Restrictions:** Where do you need more time to process?
- **Maintenance Needs:** What skills are you working hard to build?

3 The Power Supply (Sensory Needs)

Identifying what charges the system and what causes a "voltage spike".

Charging Station (Regulators)

What recharges you? (silence, movement, etc.)

Voltage Spikes (Triggers)

What trips the fuse? (lights, noise, hunger)

4 The Signalling System (Communication)

How information gets in and out of the control room.

Incoming Signals

Do you prefer visual, verbal, or practical instructions?

Outgoing Signals

How do you communicate best under pressure? (e.g., writing vs speaking)

Signal Jamming

What situations cause "traffic jams" where it's hard to respond?

5 Traffic Control (Environment & SEMH)

Current Traffic Conditions

Stress Level: (Circle one) Green / Amber / Red

Emergency Protocols

When overloaded, what is the "Emergency Stop" procedure? What does safety look like?

6 Engineering Works (The Support Plan)

Based on the map above, what adjustments do we need to make to the timetable?

Area of Need	Current Bottleneck	Proposed Adjustment (The Strategy)
Cognition		
Sensory		
Communication		
SEMH		

Guidance for Coaches and Educators

- **Co-Production is Key:** Do not fill this out for the learner. The insight comes from them defining their own routes.
- **Validate the "Maintenance Lines":** Validate struggles as high-energy routes, not character flaws.
- **Prioritise the Express Lines:** Use the DCP principle of leveraging strengths to support maintenance lines.