A word on our strategy

Through Phase II (2013-2016), Ilifa Labantwana aims to provide evidence that is based on actual experience of implementation and careful evaluation, to build consensus and mechanisms to scale up appropriate and cost-effective ECD services and support for young children in South Africa.

Phase II	**Provide implementation evidence. Put forward mechanisms for scale. Build consensus on what needs to be done and how to do it.**		
Focus	ECD **information access and use**	**Systems development and optimisation** to support implementation	Engaging the **public**
Goals	Population-based ECD targets are set and used by government for planning purposes	• **Delivery models:** Evidence of what ECCE implementation models work and how these can be scaled • **ECD regulation:** Efficient and effective systems • **ECD funding:** Increase in funding and improvement in funding mechanisms • **HR systems:** HR capacity and systems to sustain programmes	Increased public demand for ECD services Increased understanding of the role of caregivers in the first 1 000 days
Focus area	Engagement and **capacity-building** with goverment		
Goals	• Improved capacity at provincial and district levels for ECD management and oversight • ECD-related laws and policies create a more enabling eco-system		

The programmes outlined here form part of our work in systems development and optimisation, with the aim of generating evidence of what early childhood care and education (ECCE) models work and how these can be scaled.
Over the past year we have engaged partners in the implementation of five models:

1. A **Relationship Support Tool** to assist home visitors to strengthen maternal-child relationships (page 26).
2. A **home visiting Family & Community Motivator programme** (FCM) targeting children aged 0-6 years and pregnant women (page 23).
3. **Playgroups** for children aged 3-4 years, implemented through the Community Work Programme – this model is not highlighted in this publication, visit www.ilifalabantwana.co.za for more information.
4. **ECD centre** enrichment – this model is not highlighted in this publication, visit www.ilifalabantwana.co.za for more.
5. Inclusive **ECD hubs** serving local municipalities (page 18).

For each of these delivery models, Ilifa aims to document programme outcomes, costs, coverage and systems fit and, where appropriate, to develop implementation manuals to support replication by the end of Phase II.

In addition to the above, Ilifa has been supporting research to assess child outcomes on two other parenting interventions:

6. Philani's Mentor Mothers **maternal and child health home visiting model** (page 14).
7. The **Sinovuyo Caring Families Project** (page 8).

Ilifa's work on increasing public understanding around the role of the caregiver in the first 1 000 days is demonstrated by the **#LovePlayTalk** multi-media campaign (page 28).

Too great expectations?

Moving beyond the core story of brain development

Recent scientific discoveries in brain development are reshaping our understanding of early childhood development. BARAK MORGAN explains the concepts of behavioural and neural plasticity in the context of parenting interventions.

We now know more about the early childhood development phase than we ever have. What makes recent findings so compelling are the enduring and largely irreversible ways in which adverse social conditions are biologically woven into the brain, with negative consequences for health and socio-economic outcomes in later life. This insight is known as the core story of brain development.

In general, adverse early childhood social environments, such as violence, poverty and insecurity, steer brain development on trajectories that support "survival" behaviours – behaviours adapted to surviving in these harsh environments. On the other hand, favourable early childhood social environments steer brain development on trajectories that support "thrive" behaviours– behaviours adapted to making the most of favourable conditions. Broadly speaking, to survive in harsh environments depends upon quick automatic reactions: fight, flight and freeze behaviours which stem from

deep in the brain. Harsh environments do not offer the luxury of stopping to think too much. Conversely, survival in favourable, yet far more complex and nuanced social environments, requires reflective thinking and future planning. These functions stem from the neocortex, which also keeps control over the deep, reactive parts of the brain.

Brain development becomes deeply biologically embedded in two contrasting brain architectures. The first is known as top-down, and is characterised by the neocortex in command; the second is known as bottom-up, and is characterised by the subcortex in command. The process of development of either architecture occurs during early childhood because that is when neuroplasticity is highest (Figure 1).

Environmental impact on the brain's development

Figure 2 illustrates how different early environments influence brain development. The developmental landscape in A and B is identical, but differing environmental influences (not shown) at key time points, illustrated by wherever valleys divide into two, steer development down different trajectories. Once in a valley, the steep walls make it very hard to change course and there is no going back.

Behavioural plasticity means that where valleys divide, there are already neural circuits in the brain capable of going left or right. These circuits are waiting for the environment to steer behaviour one way or the other. Once this decision is made, the circuits supporting the chosen behaviour will strengthen and those in the forsaken valley will weaken. This results from ***neuroplasticity,*** which means that circuits which are used grow stronger and circuits which are not used grow weaker. The depth of the valley represents the depth to which neuroplasticity has caused "the environment" (that is the behavioural trajectory selected by the environment) to become biologically embedded and difficult to change.

This is how favourable and adverse early social environments guide brain development along contrasting top-down (positive) and bottom-up architectures. The former is adaptive in nurturing environments and the latter is adaptive in threatening environments.

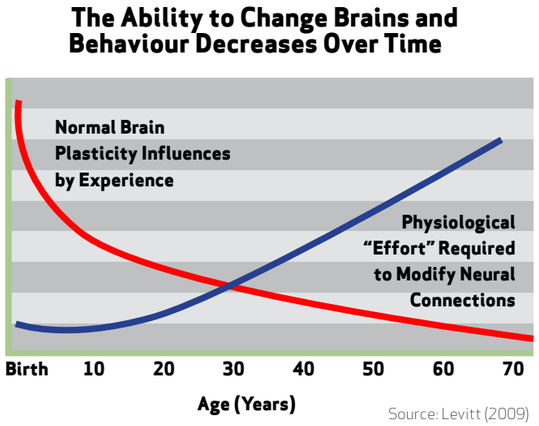

Figure 1. Neuroplasticity, the ability to change brains, decreases over time, while the effort needed to do this increases over time.

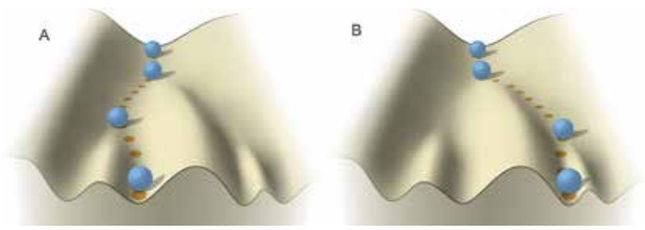

Figure 2. The core story of brain development. Valleys represent different strategic trajectories that brain development (blue ball) can follow. The different trajectories shown in these two identical landscapes are the result of different environmental conditions (not shown) steering development at key decision points in different directions. Once in a valley, even a big change in environment can do little to change the course of development.
Source: Mitchell, Kevin J (2013): Waddington's "Epigenetic Landscape" Figure_1.tif. *PLOS Biology*. 10.1371/journal.pbio.0050113.g001.

Parental investment strategies

Adverse environments also steer early brain development towards a "quantity over quality" adult reproductive strategy (having more children with less parental investment per child), while favourable environments steer brain development towards a "quality over quantity" adult reproductive strategy (fewer children with more investment per child).

The former strategy makes sense when the chances of losing a child are high and where children who do reach adulthood will need only basic life-skills to survive. The latter strategy makes sense when almost all children reach adulthood and enter a complex world where far more sophisticated skills, which require significant parental investment to acquire, are needed to succeed.

A paradox

The social significance of the core story of brain development is that caregiver/child relationships have the power to mediate the influence of the greater social environment in steering early brain development in one direction or another. Building adults' capacities to engage children in high quality, nurturing relationships is therefore of decisive importance.

But if the core story is correct, how can adults who experienced early social adversity, which steered their brains along survival and limited parental investment trajectories, establish and maintain quality nurturing relationships with children? At the same time we ***know*** that psychosocial interventions ***can*** change adult behaviour in ways which enhance nurturing relationships and increased caregiver investment per child.

Is the core story wrong? Does an intervention, in fact, work by pushing the adult brain up and over into the next valley? Clearly not, even low-intensity interventions change caregiver behaviour far too quickly for such big structural brain changes to occur.

The solution to this paradox lies in ***behavioural plasticity***. A change in social environment can unlock nurturing behaviours which were not evident, simply because the environment kept the underlying circuits locked away in the brain. Changing the environment in the right ways can unveil ***latent*** nurturing behaviours one might not have suspected were there.

But where do these latent nurturing behaviours come from? How does it suddenly seem possible to go back in time up a long, deeply embedded valley to the point where the road forked and behavioural plasticity was once high?

> "There are domains where behavioural plasticity remains high even after brain and behaviour have seemingly become deeply embedded along one valley. Parental investment is one of these domains."

The answer is that there are domains where behavioural plasticity remains high even after brain and behaviour have seemingly become deeply embedded along one valley. Parental investment is one of these domains. Countless psychosocial interventions demonstrate that the neural pathways for both low and high investment remain available. This is because these pathways are easily switched on or off by simple hormonal signals which are very sensitive to social environment. No major brain rewiring or effort is necessary to activate these unused neural pathways. In short, Figure 1 does not apply here.

Beyond the core story of brain development

The core story of brain development emphasises how early social adversity and neuroplasticity conspire to biologically embed brain architectures that result in socially undesirable long-term behaviours, which are very difficult to reverse. In contrast, this article highlights an abundance of behavioural plasticity in the domain of parental investment, which the core story of brain development implies should not be there.

The good news is that adult investment in nurturing relationships with children can increase much more readily than the core story suggests. The challenging news is that a shift in adult behaviour from a psychosocial intervention is unlikely to endure if psychosocial conditions change back again. This implies that psychosocial interventions must be sustained if behavioural change is to be sustained.

It is tempting to conclude from the core story of brain development that the physical, psychological, social and economic wellbeing of individuals, families, communities and nations all hinges around the quality of adult-child nurturing relationships. But unlocking latent behavioural potential in adults for greater caregiver investment requires a greater social environment that not only unlocks but also ***keeps*** these highly plastic, readily reversible behaviours unlocked.

This analysis does not in any way question the need for psychosocial interventions with proven efficacy, but rather serves to place caregiver behaviour in its broader biopsychosocial context. Behavioural plasticity challenges any expectations, ***that if we can just get parental investment during early childhood right,*** neuroplasticity and biological embedding will make everything better, without anything else having to change first. But human behaviour cannot be rigidly programmed during early childhood to change society bottom-up. Society must take steps to reduce social adversity, so that vast stores of latent parental investment can be unlocked from the top-down for the benefit of children of all ages. Overcoming social adversity cannot be put on the shoulders of caregivers, nor can it be our long-term expectations of the children they care for.

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