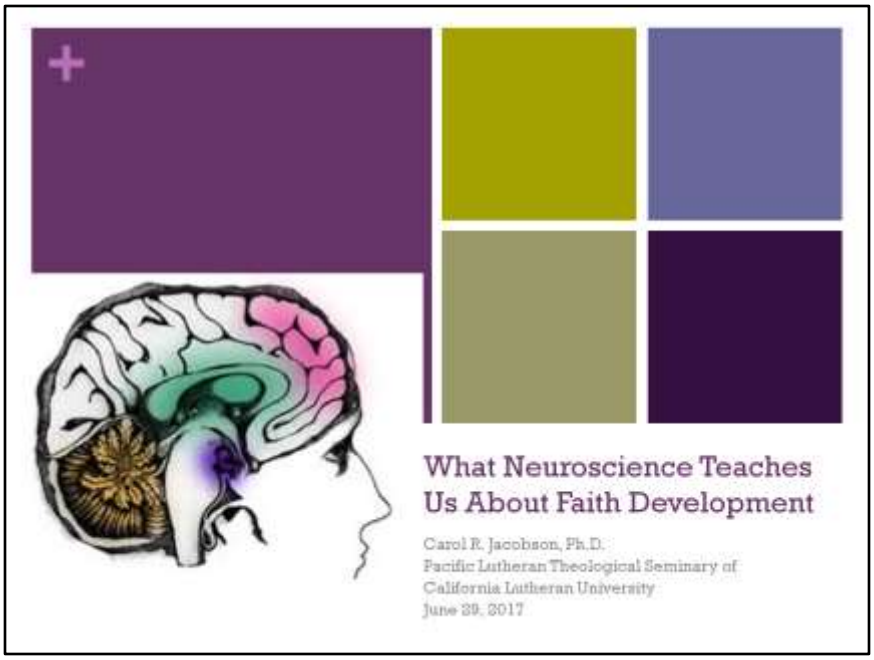


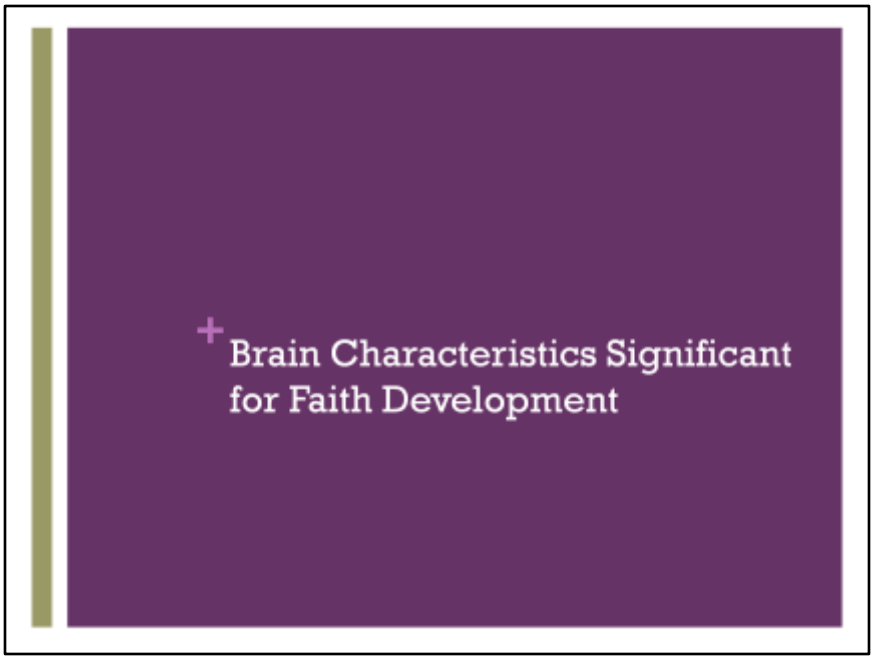
- Introduce myself, Associate Professor of Practical Theology at PLTS, a graduate school of California Lutheran University

- I am not a neuroscientist!!

- How I first became interested in what neuroscience could teach about faith formation

    - Lily Grant — Working with Youth and Faith Formation
    - Teaching classes in Christian Education and Youth Ministry

- Please feel free to stop me at any point to ask questions — you won't be interrupting me!



- Neuroscience a new, expanding field

- Dependent upon the development of magnetic resonance imaging [MRI] which allowed scientists to see what was happening in the brain while

people were experiencing all kinds of things, visual, emotional, spiritual, dream states, etc.

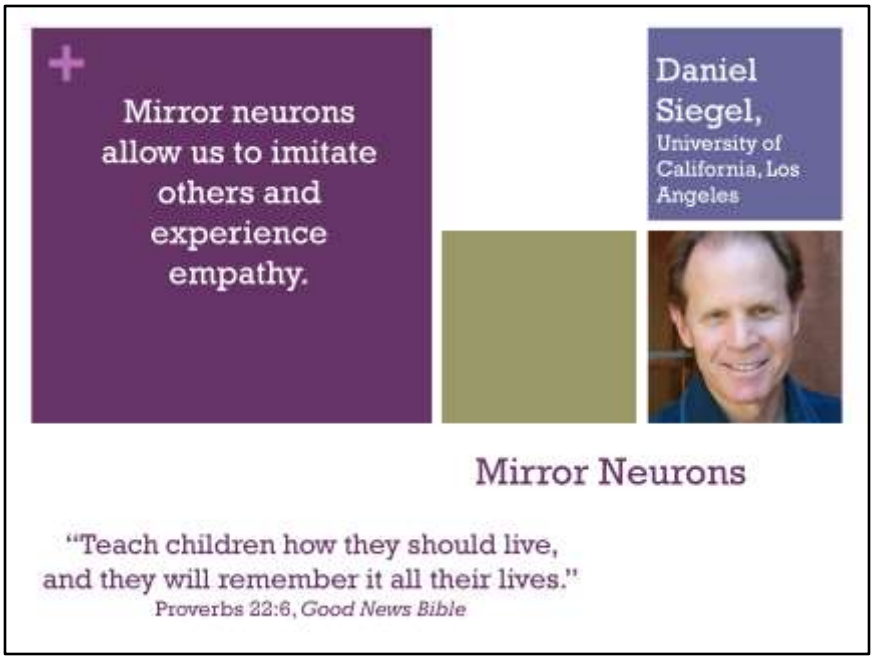
- I have chosen three characteristics of brain development that I find significant for faith formation

- Ongoing plasticity:
  - used to believe otherwise – brain developed by puberty
  - brain develops until mid 20s
  - now plasticity — our brains are changing and renewing connections throughout life

- This happens in response both to experiences we have **and to training** — these two are the hallmarks of the catechumenate process. Both the experiences of faith, of incarnation, of ritual and embodiment AND training in spiritual practices and baptismal living in community

- Our brains are open to training, to education in the practices of faith and the application of grace/baptismal living

- Proverbs 22:6



- Mirror neurons are a type of brain cell that allow us to imitate others — essential for learning

- Not only are our brains open to training [plasticity] throughout our lives, but mirror neurons allow us to learn by imitating

others and internalizing what we are imitating throughout our lives as well.

- Think of children, who we know learn language by imitating sounds they hear, who learn everything by imitating. It is the same for learning about the faith and about faith practices

  - like praying, singing, Bible reading and study, even conversations about God and faith,
  - This is why in a minute I'm going to ask you to think together about who might be

an example of faithfulness for you — it is your mirror neurons that are at work when you are trying to follow their example.

- And empathy — to "put yourself in somebody else's shoes.

  - Mirror neurons are responsible for our abilities to see others as part of our common humanity — we are all God's beloved children — it is mirror neurons that help us understand that we are all baptized into one family — the human family that God

dearly loves.

- Mirror neurons are those brain cells that underlie the concept of Ubuntu — “a person is a person through other persons.” More about this later…

- Because our brains are plastic, always changing in response to experience and to training, our brains are always making new neurons, including mirror neurons

- Now it is important to see how

brains mature through a process called “neural pruning.”

- I have recently learned [through some imitation and some training!] to plant and tend my backyard garden. So I have learned about pruning roses and my lemon tree. I don’t prune branches that are fruit or flower bearing, but those branches that are “runners” without flowers or lemons, I prune. That way the tree and the rose bush grow stronger with a shape that promotes more roses and lemons.

- The process of growth and maturation in our brains is similar to this pruning process. Those neural pathways and connections that are nourished, reinforced, used grow stronger, and those that are not, atrophy and are pruned away by the brain.

- Applying this to faith formation reminds us that Proverbs 22:6 is "on to something" here. In other words, it is vital that for those who are seeking the life of discipleship, faith practices must be nourished, reinforced and practiced over time, so that

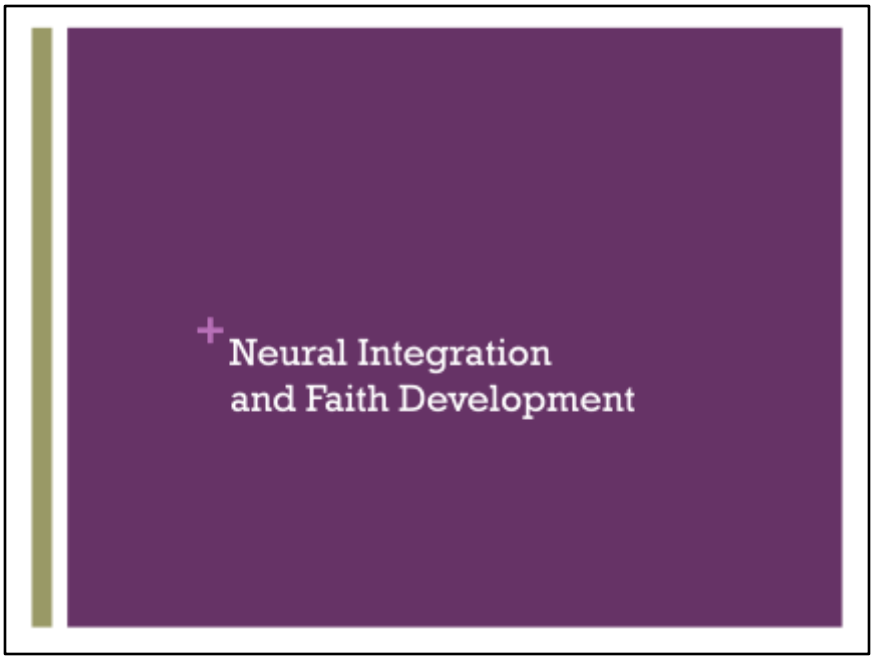
those become and remain strong neural pathways, upon which we can rely.

Explain these questions a bit – you know – what's your favorite way of connecting with God.

Exemplar could be someone you know personally, or someone like

Explain Think-Pair-Share

Would anyone like to share something from their conversations?



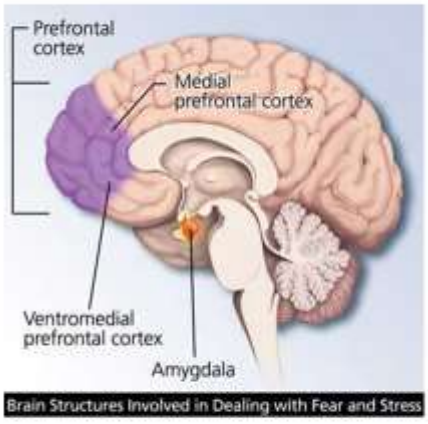
- Neural pathways are constantly changing, developing new connections, strengthening useful pathways, making new mirror neurons, as well as other neurons.

- Now let's turn our attention to

the processes of neural integration and their significance for faith development.

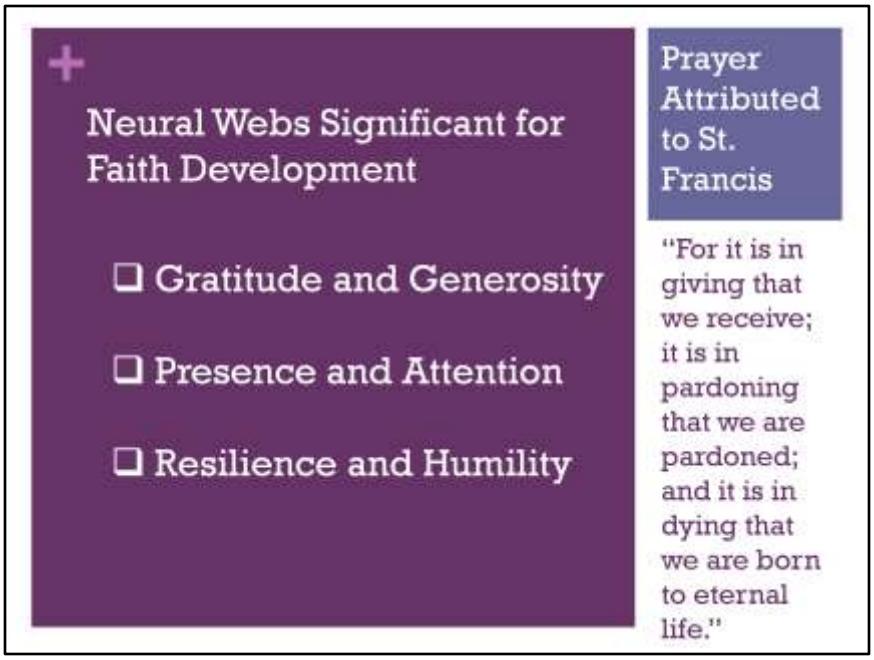
+ The middle prefrontal cortex:

- creates and maintains nets of "neural integration"
- is the locus of emotional regulation and moral deliberation



Brain Structures Involved in Dealing with Fear and Stress

- Where does all this take place? Neuroscientists identify the middle prefrontal cortex as the important place.
- The prefrontal cortex creates and maintains nets [think fishing nets or spider webs] of neural integration. Connections, short cuts, superhighways etc. MacArthur maze
- As such, it has been identified as the locus of emotional regulation and moral deliberation

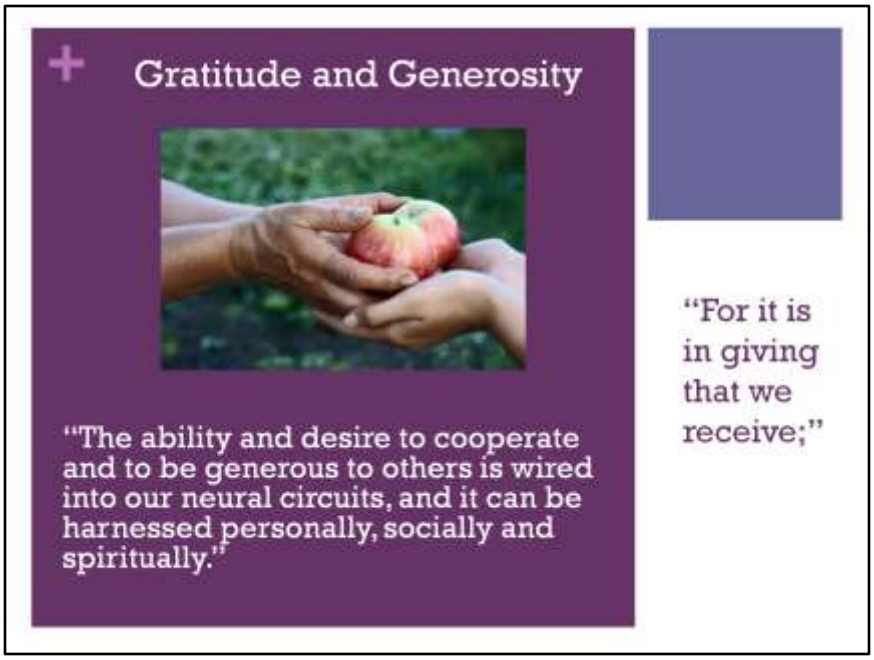


- Three neural webs have been identified in the research of Richard Davidson [the neuroscientist who has demonstrated the ongoing plasticity of our brains] that I think are significant for Faith Development

    - Gratitude and Generosity
    - Presence and Attention
    - Resilience and Humility

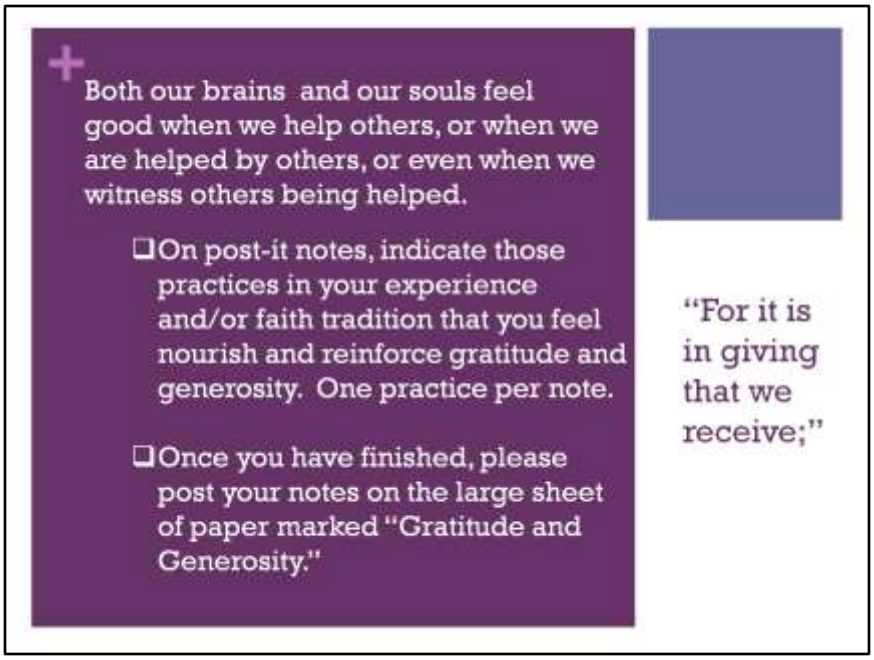
- Isn't is awesome and amazing that these three webs of connection come "hard-wired" as part of the human brain!!

- Chosen the example of the Prayer Attributed to St. Francis: READ

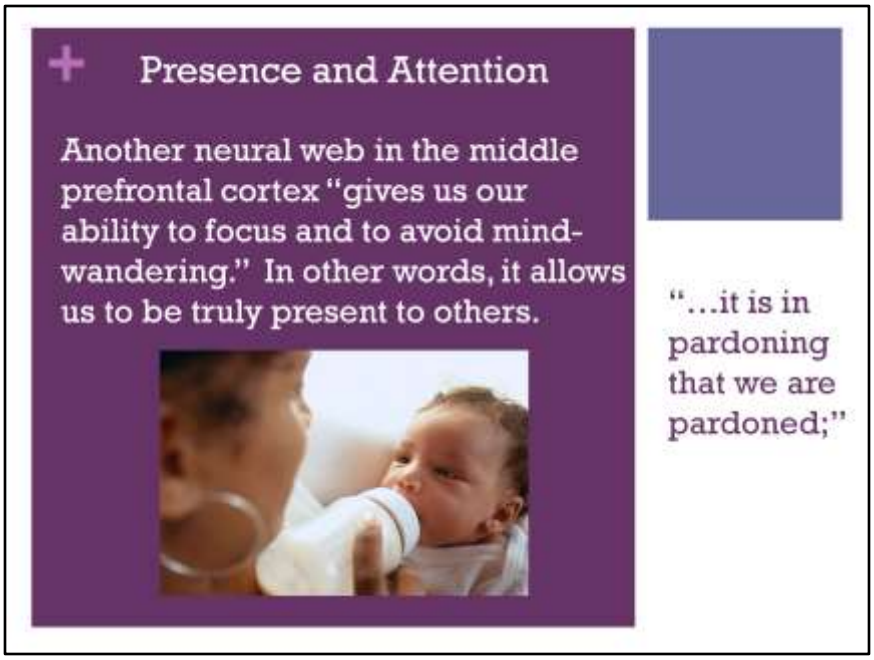


- As Archbishop Desmond Tutu says, our brains "are wired to be caring for the other and generous to one another. We shrivel wen we are not able to interact. … (I)n a very real sense we're meant for a very profound complementarity. It is in the nature of things. … I mean I could not speak as I am speaking without having learned it from other human beings. I could not walk as a human being. I could not think as a human being, except through learning it from other human beings"

We belong in this delicate network." [*Book of Joy*, 59-60]

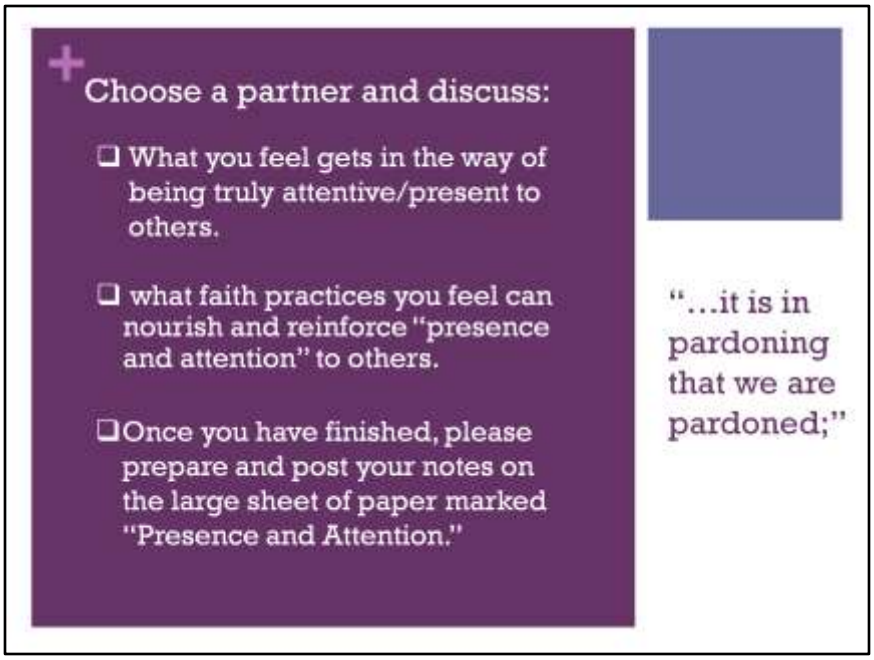


- Explain this exercise in Open Space Learning —
- Indicate the large sheets
- Make sure everyone has a set of post-its and a pen

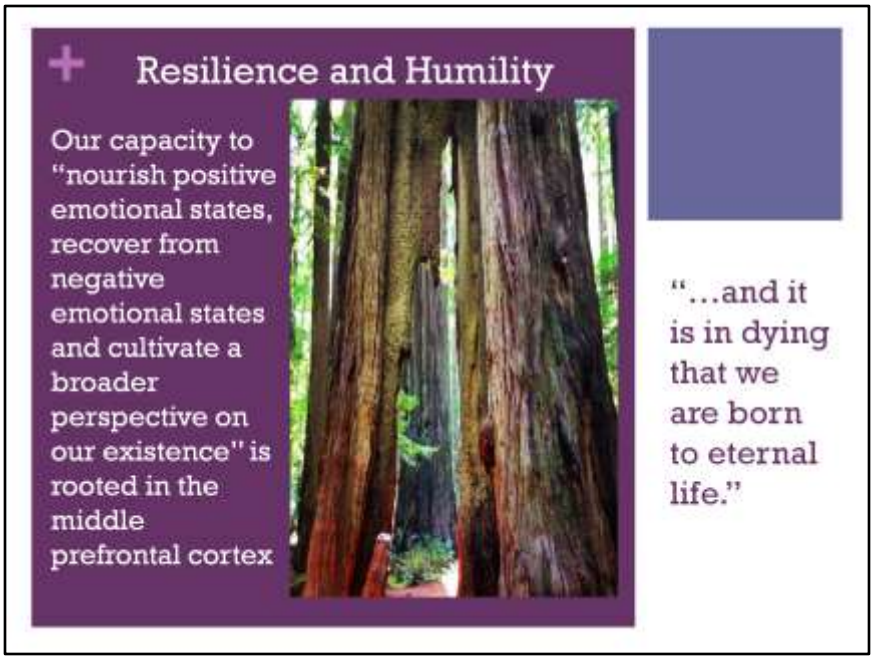


- Look at this beautiful picture — it is the essence of presence and attention. Both caregiver and child are completely present and attentive to one another
- This second neural web is essential to **the experience of and training in** spiritual practices of meditation, prayer, silence, corporate singing
- Perhaps that seems obvious, but this neural web is also important to faith practices like forgiveness and patience both individually and in community.
- As Daniel Seigal puts it, "the real secret" to cultivating presence and attention "may simply be extending the brief space between stimulus and response. Meditation [and prayer] seems to elongate this pause and help expand our ability to choose our response. For example, can we expand the momentary pause between our spouse's annoyed words and our angry or hurt reaction?
- Remembering ongoing plasticity that responds to training and taking into account our mirror neurons, we now add neuroscience's insight that increasing presence and attention allows us the freedom to choose to respond rather than to simply react.

- St. Paul reminds us that “love is patient and kind…and the psalmist proclaims that God is slow to anger and abounding in steadfast love.



- Explain the process here
- Two sets of post-its — 2 sides of the sheet



- I imagine that many of us are familiar with the growth cycle of the redwood tree, which requires fire or even death as part of its reproductive capacity. That's what this image is about.

- It turns out that our capacity to nourish positive emotional states, recover from negative emotional states and cultivate a broader perspective on our existence is rooted in the middle prefrontal cortex.

- As St. Paul reminds us, "love is patient; love is kind; love is not envious or boastful or arrogant or rude. It does not insist on its own way; it is not irritable or resentful; it does not rejoice in wrongdoing, but rejoices in the truth. It bears all things, believes all things, hopes all things, endures all things.

- Our prefrontal cortext is the seat of emotional and spiritual resilience. Related to this is the spiritual practice of humility — namely the cultivating of a broader perspective on our existence.

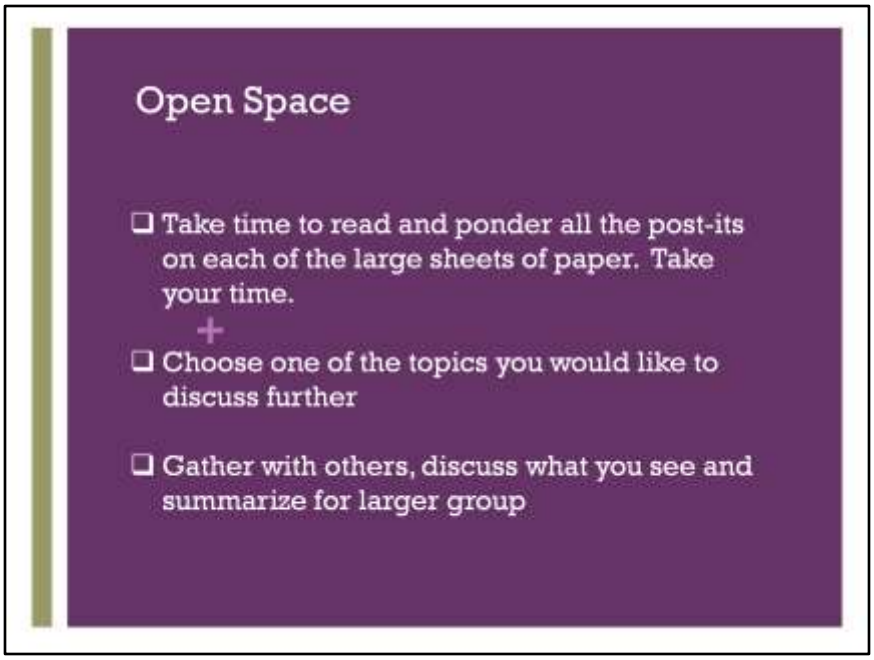
- "When we have a wider perspective, it can lead us to humility and the

recognition that as human beings we can't solve everything or control all aspects of life. Again, we recognize that we need others. … Our vulnerabilities, our frailties and our limitations are a reminder that we need one another."

Take the next few minutes to consider the following questions:

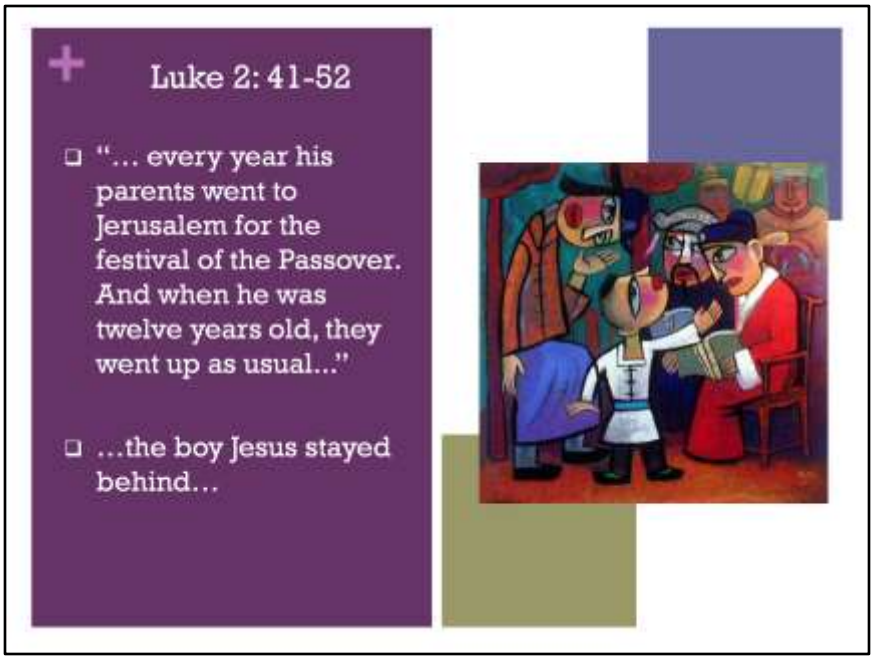
- ❑ Why do you think that emotional resilience is important to faith formation?
- ❑ Why do you think humility is important for faith formation?
- ❑ Please summarize your thoughts on your post-its and place them on the larger sheets.

"…and it is in dying that we are born to eternal life."



Explain the process.

A Concluding Faith Development Story

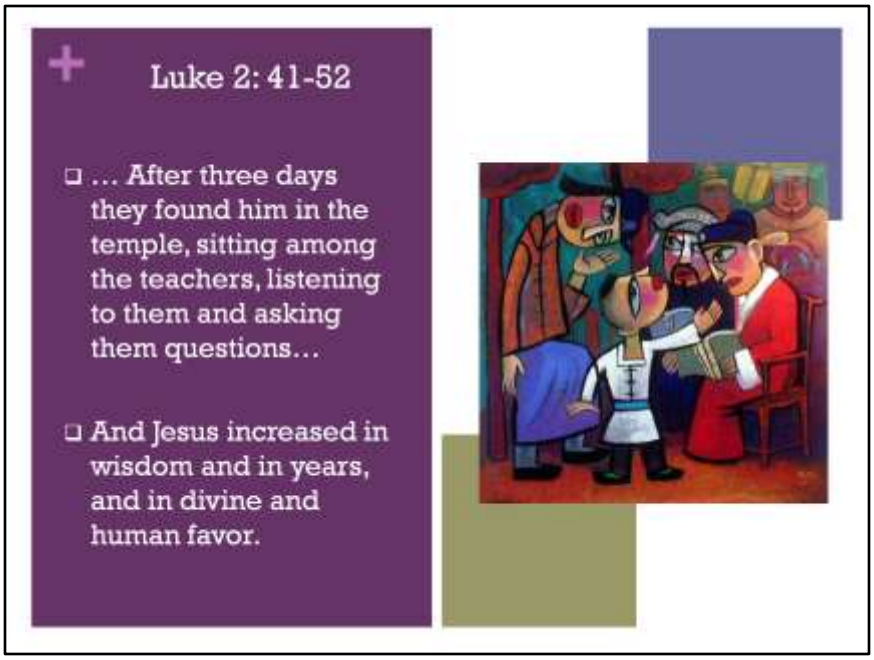


- Mirror neurons and neural pruning — every year [those pathways that are nourished and reinforced remain

- Jesus stayed behind
    - something in his experience of being in the community that year at the festival had drawn him deeper along the journey of faithful living.

    - Maybe it was a ritual, maybe it was a conversation, maybe it was a prayer or song. We don't know. What we do know is that he wanted to know more.

    - His experience resulted in the broadening of his perspective and awareness. So, he stayed behind…



- These teachers were examples of faithful living to Jesus, rabbis worthy of emulation
    - I have heard many a sermon that interprets this text as if somehow the rabbis were mistaken simpletons and Jesus smarter than all of them. But that's not what the text says.
- Is it too much to imagine that Jesus' neural net of presence and attention was developing and growing new connective fibers during those three days?

Resources for Further Study

- His Holiness The Dalai Lama and Archbishop Desmond Tutu, *The Book of Joy: Lasting Happiness in a Changing World*, Avery Press, 2016.
- Richard Davidson, *The Developing Mind: How Relationships and the Brain Interact to Make Us Who We Are*, The Guilford Press, 2015.
- Daniel J. Siegal and Sharon Begley, *The Emotional Life of Your Brain*, Avery Press, 2012.