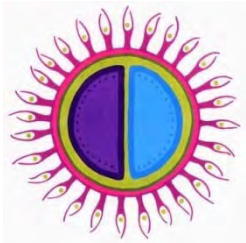


SCIENCE: our environments, our stories;
exploring “know, do, value” aspects
and
role of environment
for
conceptual space shifting

presentation for:



Aboriginal Studies Program
- ABS250F Indigenous Environment

University of Toronto (Distinguished Lecturer Series)

5 November 2007

Cheryl Bartlett, PhD
Canada Research Chair
in Integrative Science

CAPE BRETON
UNIVERSITY



... consider:

conceptual space shifting

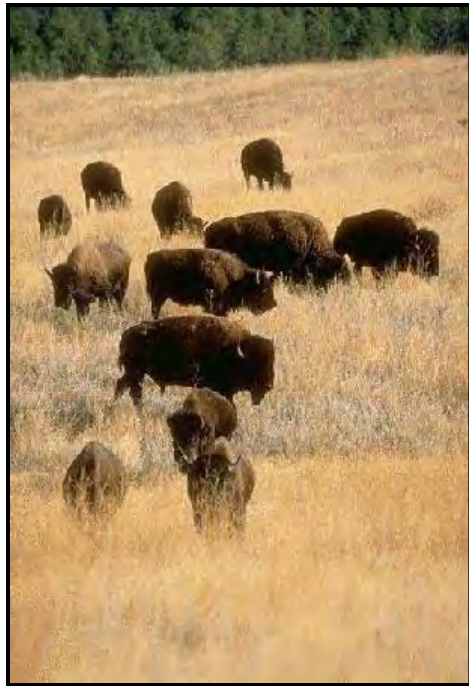


KNOW

VALUE

DO

human
mindful consciousness



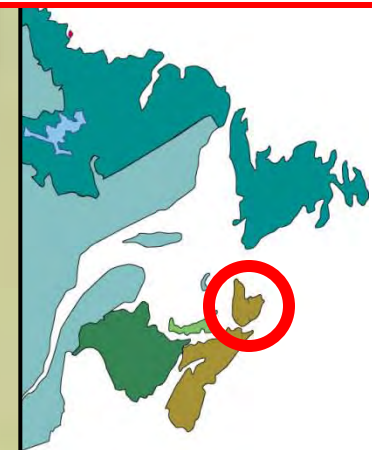






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Cape Breton Island
Unama'ki (*Land of Fog*)





Canada Research Chairs / Chaires de recherche du Canada / Canada

Social Sciences and Humanities Research Council of Canada / Conseil de recherches en sciences humaines du Canada

Canada Foundation for Innovation / Fondation canadienne pour l'innovation

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Mi'kmaq College Institute / Mi'kmaq Espi Kina'matno'kuom



IWK Health Centre Foundation

IAPH

ATLANTIC ABORIGINAL Health Research Program

Mi'kmaq Elders

NOVA SCOTIA Health Research FOUNDATION

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UNAMA'KI INSTITUTE OF NATURAL RESOURCES

KECCA Knowledge: Education and Cultural Consultant Associates

NSERC CRSNG

Mi'kmawey Debert

Eskasoni Detachment Royal Canadian Mounted Police / Gendarmerie royale du Canada

The central dilemma of science education today is the teaching of science from only one cultural perspective, and in an incomplete and non-connected manner.

Gregory Cajete, PhD, scientist & educator, Univ. of New Mexico

Indigenous

Western

Co-Learning Journey

A shared understanding of how to talk together

This visual is based on the Medicine Wheel (or Circle of Learning) which is a commonly used Aboriginal teaching tool. The visual shows that within the discussion, all have a role to play. Each person has an opportunity to speak, to share, to teach, and to learn.



Each participant gains some new understandings of Mother Earth and her lessons for humans about health, healing and wholeness based on sharing, listening, and discussing.



**10+ years: where our journey
has been and continues to be ...**

Integrative Science

**bringing together Indigenous and Western
scientific knowledges and ways of knowing**

Indigenous

Western

Integrative Science



Integrative Science

SCIENCE

education, research, applications,
youth and community outreach

Indigenous

our sciences
our stories

Western

“bringing our knowledges together”

our worldviews

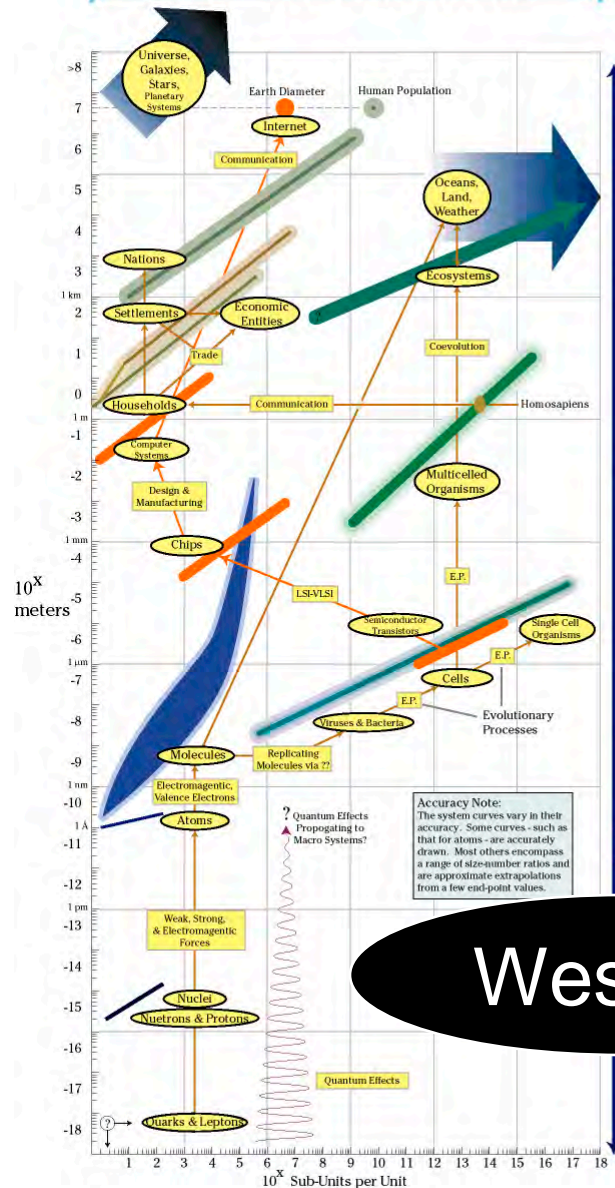
... consider:



Indigenous

logo above from:
Aboriginal Policy Research Conference
Ottawa, March 2006

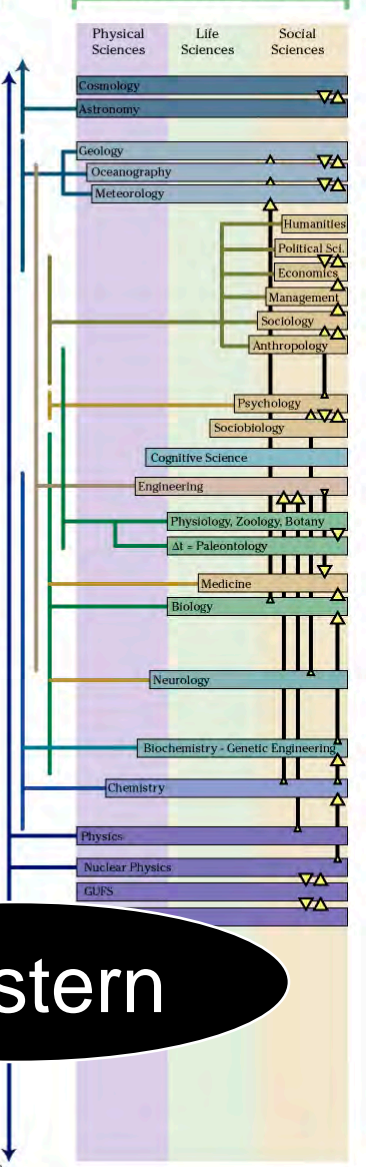
Some Physical Systems



Western

image above from: www.necsi.org
<http://www.necsi.org:16080/projects/mclemens/syshier.gif>

Some Systems of Human Knowledge



Co-Learning

Go into a forest, you see the birch, maple, pine.

Look underground and all those trees are holding hands. We as people must do the same.

(late Mi'kmaq Chief, Spiritual Elder, and Healer Charlie Labrador)



Co-Learning

Go into a forest, you see the birch, maple, pine.

Look underground and all those trees are holding hands. We as people must do the same.

(late Mi'kmaq Chief, Spiritual Elder, and Healer Charlie Labrador)



“Two-Eyed Seeing”

learning to see with the strengths of each & together



Indigenous



Western



Mr. Albert Marshall, Mi'kmaq Elder
Eskasoni First Nation

stories of our interactions with and within nature

Science



common ground

Both Indigenous and Western scientific knowledges are based on observations of the natural world.



PATTERN RECOGNITION

common ground

Both Indigenous and Western scientific knowledges result from the same intellectual process of creating order out of disorder.

order

= **PATTERN-BASED STORIES**



stories of our interactions with and within nature

Science

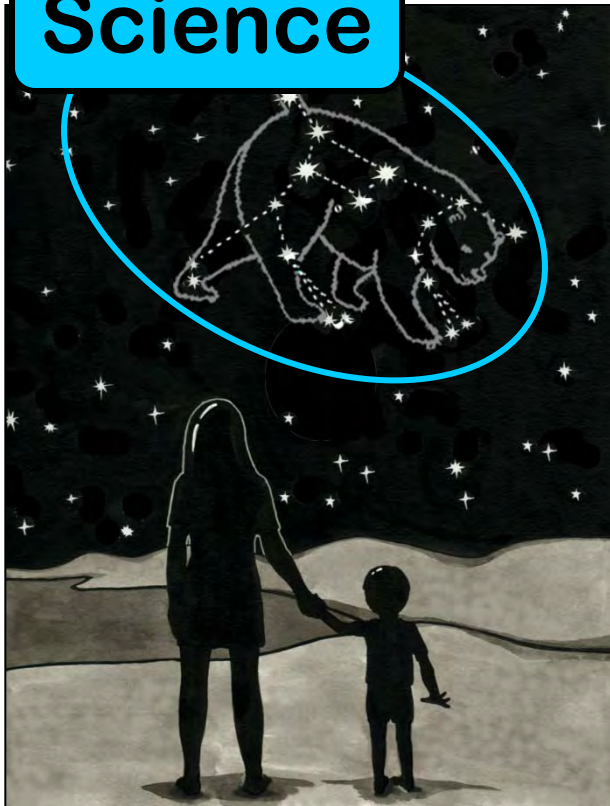
Science is
dynamic,
pattern-based
knowledge.

= PATTERN-BASED
STORIES



stories of our interactions with and within nature

Science



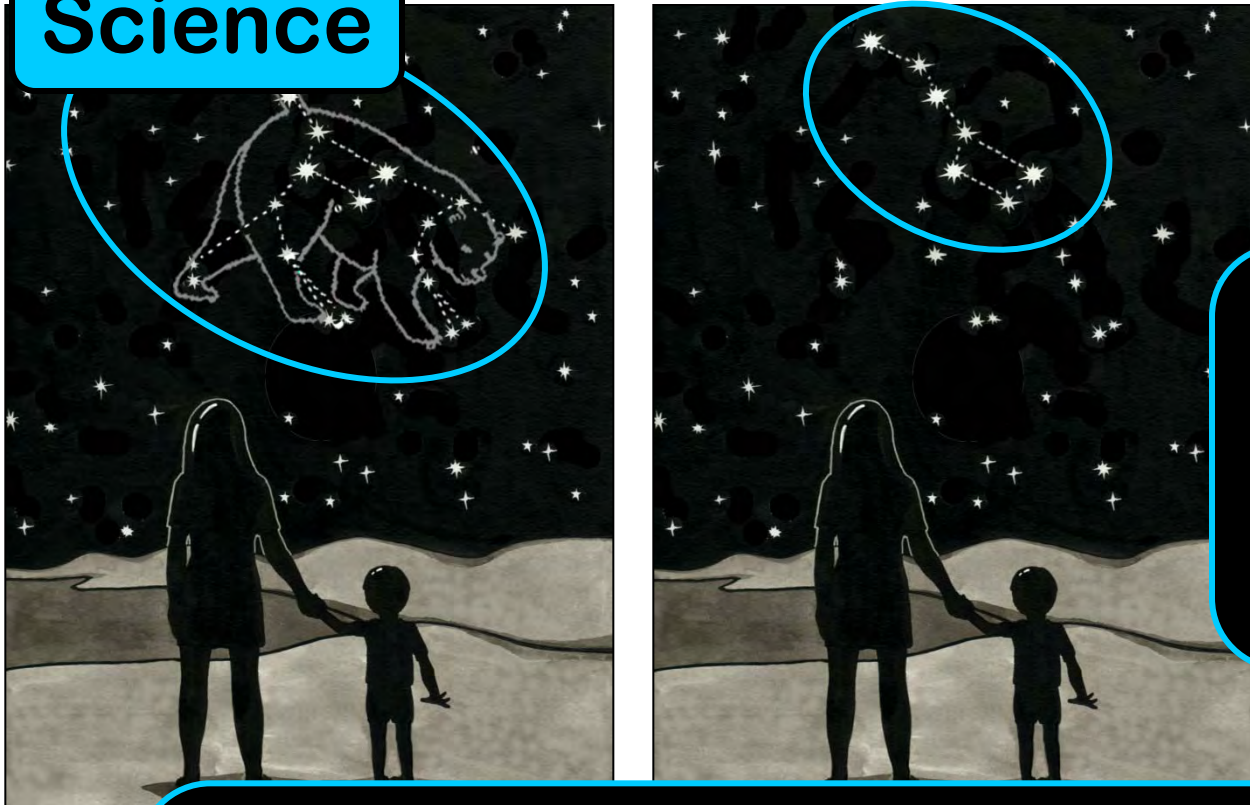
PATTERN

- recognition
- transformation
- expression

- various **pattern smarts**
- various ways to connect the dots
 - variety in our stories

stories of our interactions with and within nature

Science



the patterns
that we see
within nature
reflect our ...

**SANCTIONED
PERSPECTIVES & INTELLIGENCES:**
who we are; where we are; where we were;
what we know, do and value

... consider:

conceptual space shifting



KNOW

VALUE

DO

human

mindful consciousness

Land of Eagle



ONE WHO SEES BIG PATTERNS

domain of the
unknown

FEAR



domain of the
known



**“must become
PATTERN-able”**
(Douglas J. Cardinal)
world renown architect

must learn:
“conceptual

space shifting”

“pattern smarts”

multiple intelligences theory

(H. Gardner, Harvard Univ.)

sanctioned
world view or methodology

KNOW

VALUE

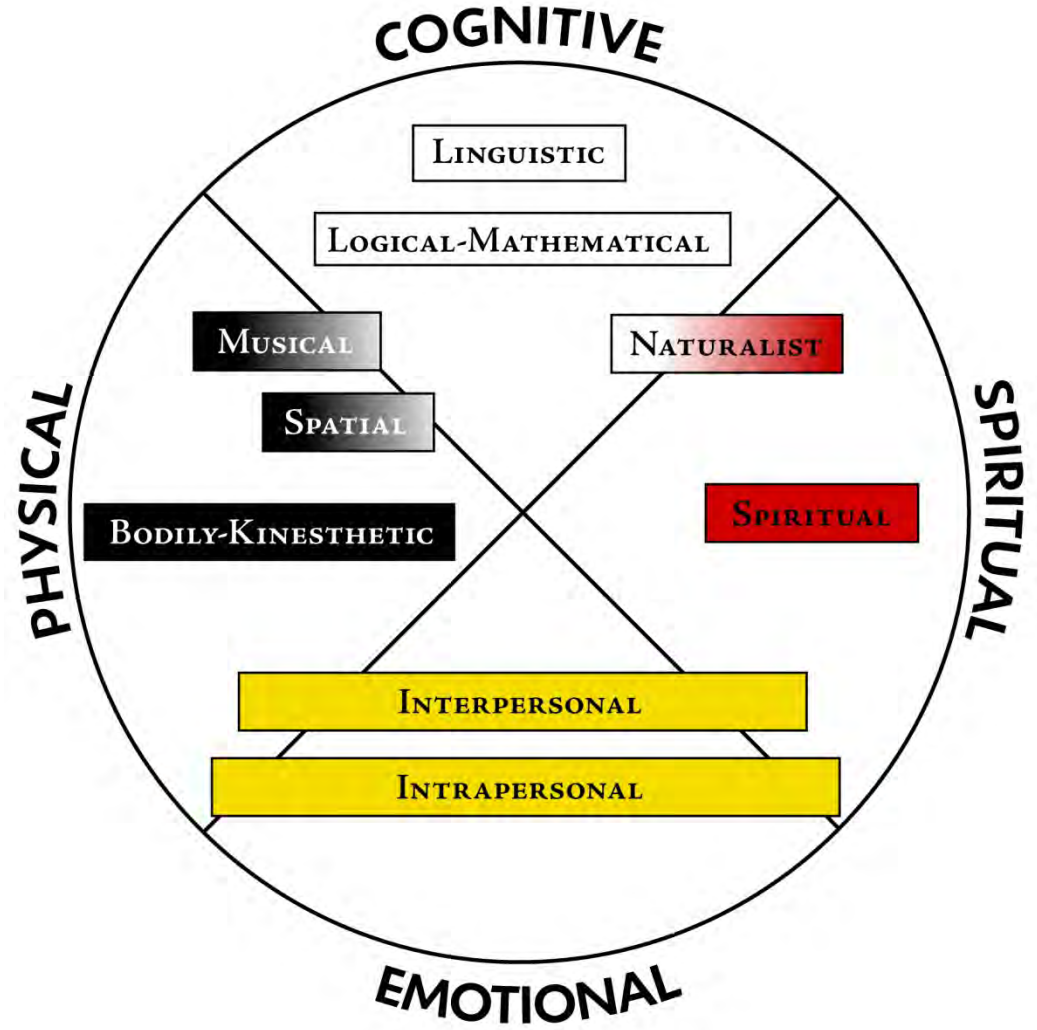
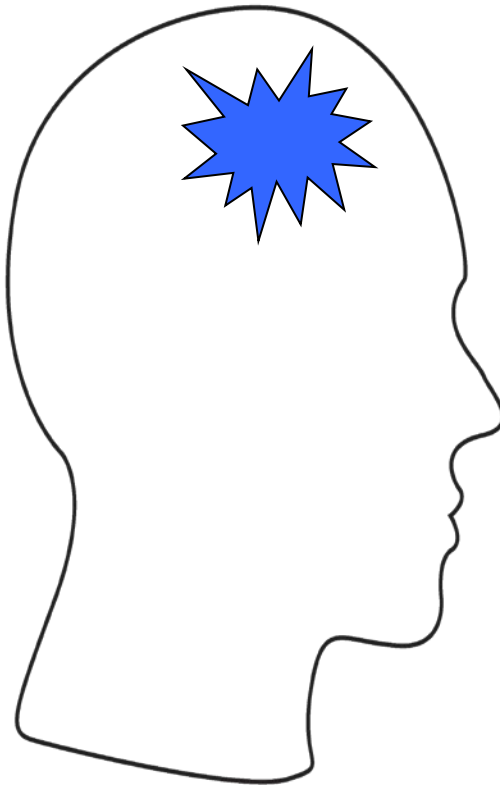
DO



- ◇ numbers (logical-mathematical)
- ◇ language (linguistic)
- ◇ music (musical)
- ◇ body (body-kinesthetic)
- ◇ spatial (spatial)
- ◇ other people (interpersonal)
- ◇ self (intrapersonal)
- ◇ naturalist (naturalist)
- ◇ spiritual / existential *



“pattern smarts”





**Go into a forest, you see the birch, maple, pine.
Look underground and all those trees are holding
hands. We as people must do the same.**

(late Mi'kmaq Chief, Spiritual Elder, and Healer Charlie Labrador)



Indigenous

Western

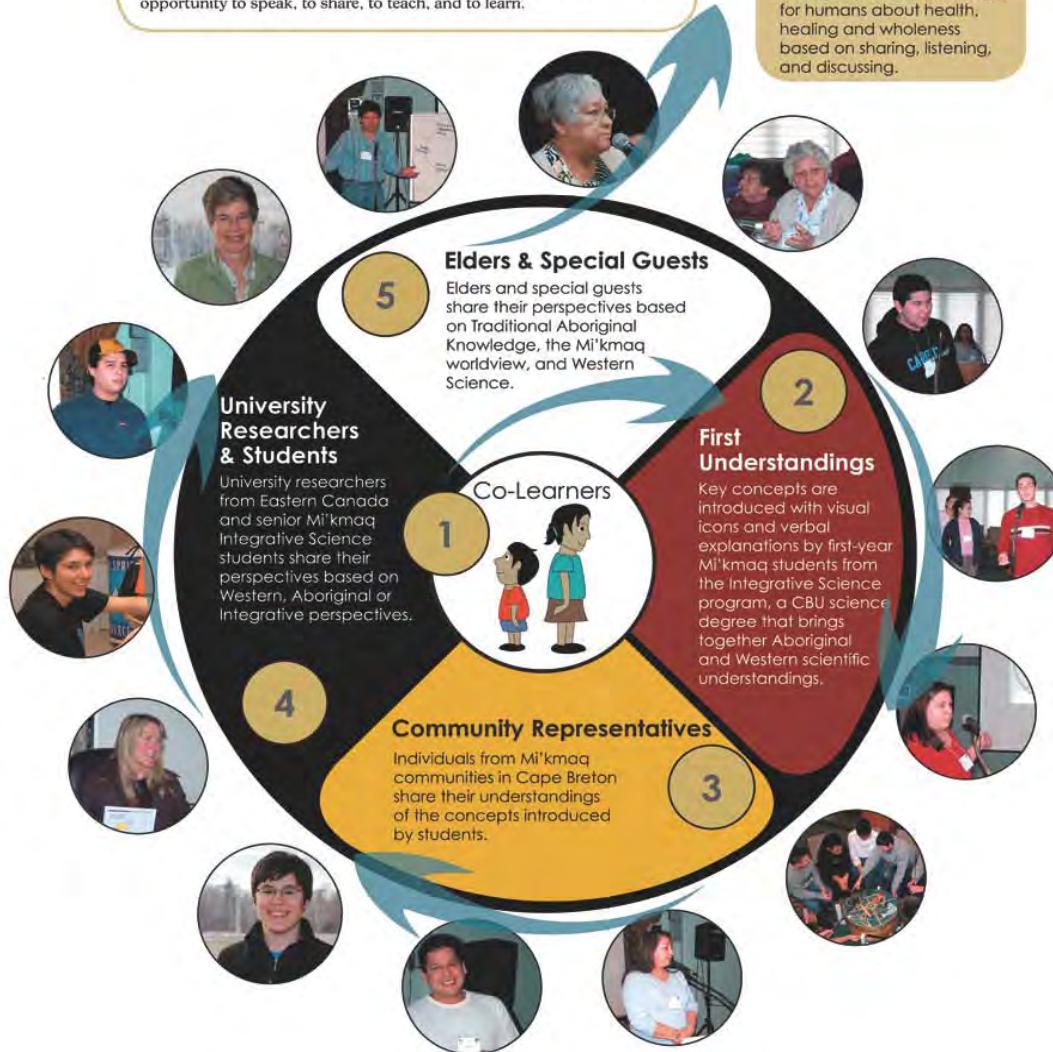
Co-Learning Journey

A shared understanding of how to talk together

This visual is based on the Medicine Wheel (or Circle of Learning) which is a commonly used Aboriginal teaching tool. The visual shows that within the discussion, all have a role to play. Each person has an opportunity to speak, to share, to teach, and to learn.



Each participant gains some new understandings of Mother Earth and her lessons for humans about health, healing and wholeness based on sharing, listening, and discussing.





**... to Co-Learn, we
must “WALK” our
“know, do, value”**

**= an insight ...
coming via
extension
of understandings
from discussions
about healing
language**

We must become able to put the “**know, do, value**” aspects of our worldviews in front of us ... like an object ... and then we must develop the abilities to walk around them ... to acknowledge them, take ownership of them, understand them, and put them beside those of another worldview ... to see our mutual strengths and to begin working together in a reciprocally respectful manner.



Comparative Big Picture Perspectives on the Environment




the strengths
of Aboriginal
knowledge



the strengths
of Western
knowledge


ABORIGINAL WORLDVIEW




Mi'kmaq language and
Indigenous Science

Eco-reflective and
participatory

Sense of connectedness
with one's environment



WESTERN WORLDVIEW

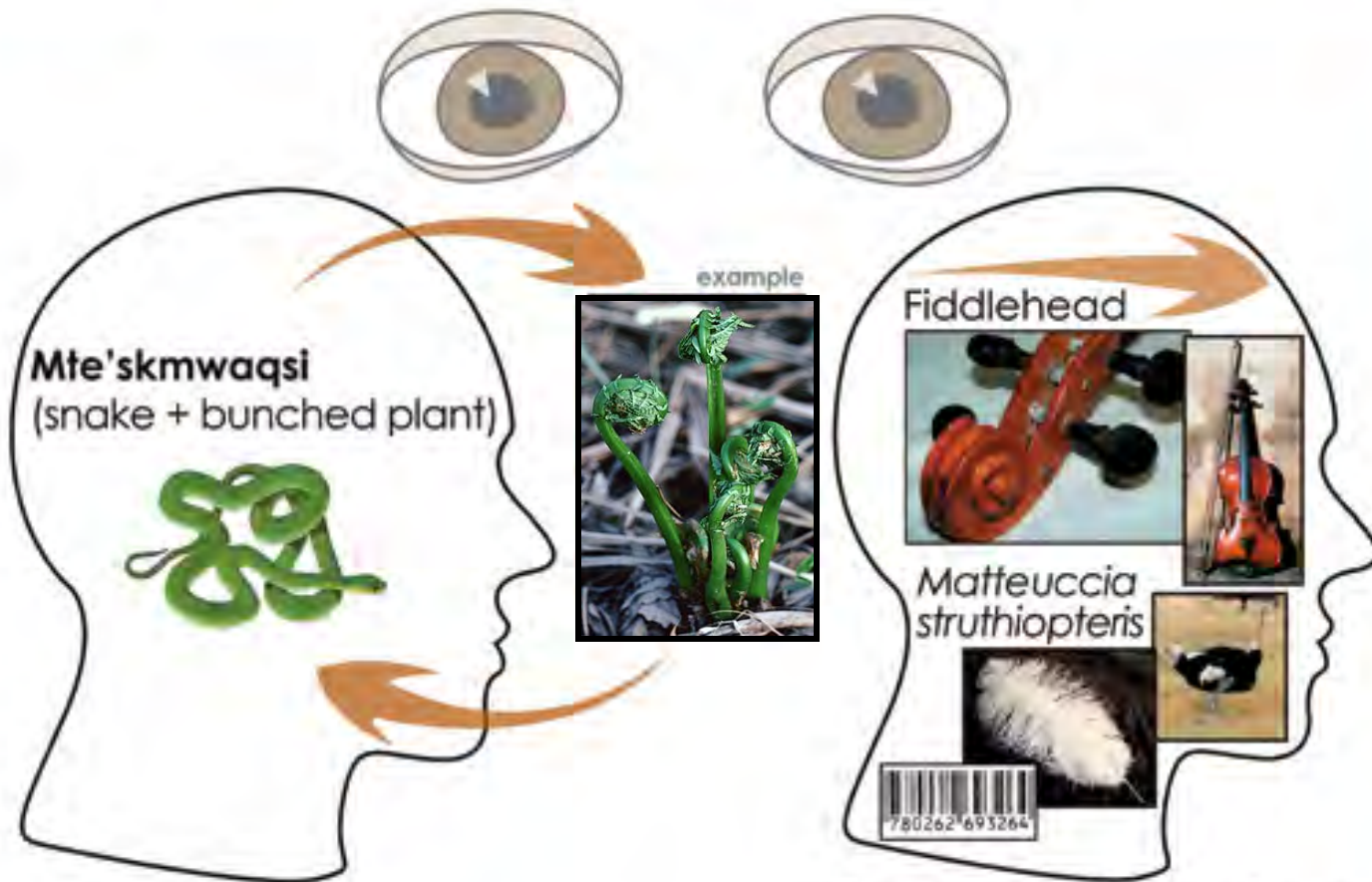


English language and
Western Science

Cogno-centric and
detached

Sense of disconnectedness
from one's environment

Seeing relationships: plant names and my environment



The eco-reflective Mi'kmaq plant name describes the fern in terms of the relationship between it and another living being present in the same local environment, a snake.

The cogno-centric Western plant names describe the fern in terms of symbolic objects, organisms, and even numbers that might reflect the patterns of the plants but that are not related to the local environment. The barcode exemplifies extreme detachment from environment.

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

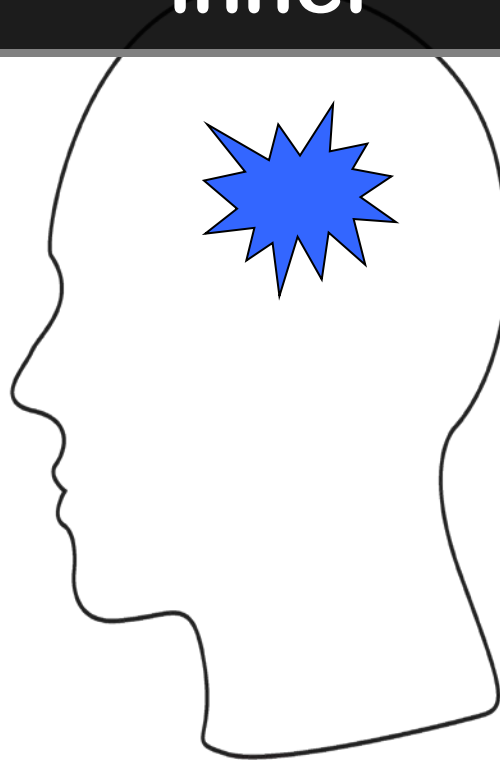


PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

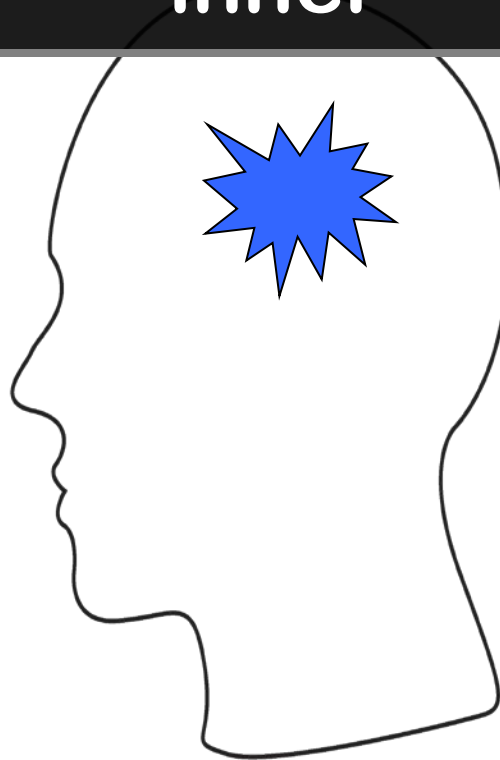


PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



Mtèskmwaqsil



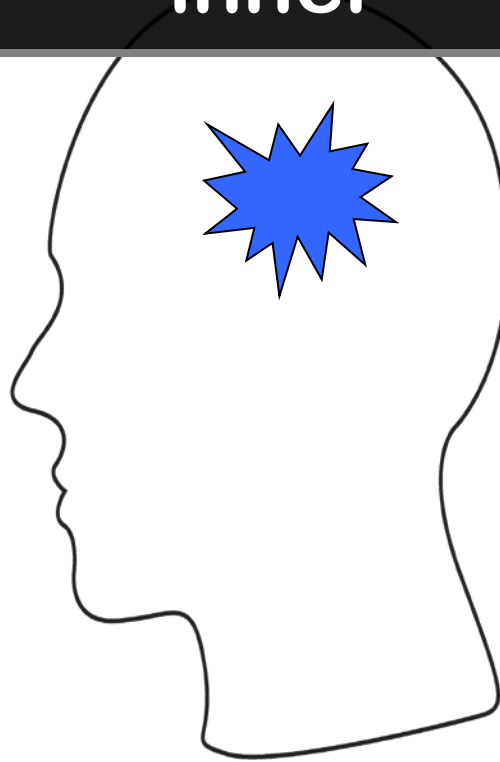
T. Som

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



Mtèskmwaqsil



Fiddlehead
fern

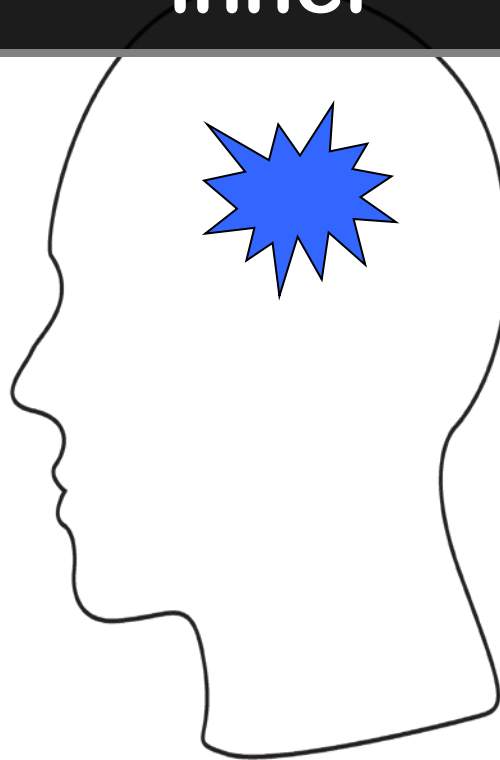


PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer



Attu'tuejualu



millefolium

1000



Yarrow



Acknowledgments



Sana Kavanagh BSc, MES (in progress),
Research Assistant, Integrative Science, Cape Breton University

Acknowledgments



Murdena Marshall BEd, MEd
Mi'kmaq Elder & Spiritual Leader
Eskasoni FN, Nova Scotia
Associate Professor (retired)
of Mi'kmaq Studies

CAPE BRETON

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PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Ursa major
muin

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Big
Dipper



PATTERN CONCEPTUAL FRAMEWORK

outer

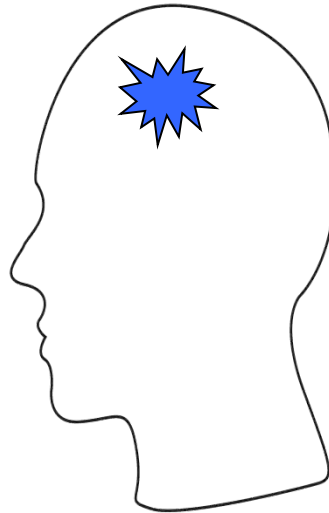
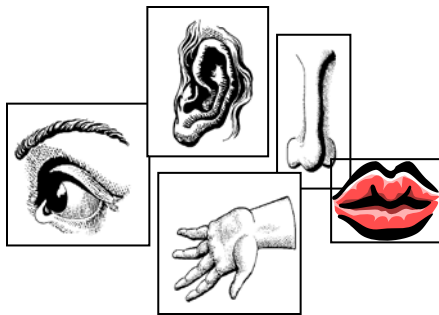
inner

outer

natural

ideal

abstract



recognize
pattern

transform
pattern

express
pattern

**SANCTIONED
PERSPECTIVES & INTELLIGENCES**

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

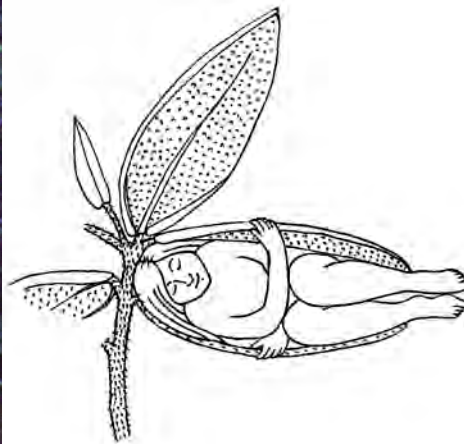
inner

outer

natural

ideal

abstract



Etuiwulnuksit

etui + wul
each side + good

feel + plant
nuk+ sit

PATTERN CONCEPTUAL FRAMEWORK

outer

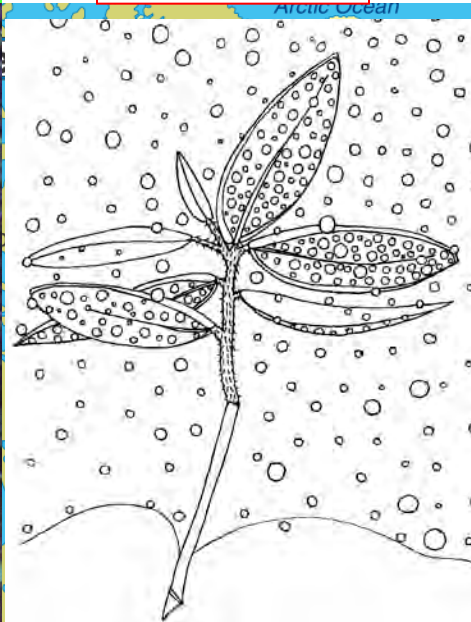
inner

outer

natural

ideal

abstract



Ledum groenlandicum

ledum

oriental shrub

groenlandicum

of Greenland

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Altaqiaqwel

Altaqiaq + wel

**creepy crawling +
thing**

PATTERN CONCEPTUAL FRAMEWORK

outer

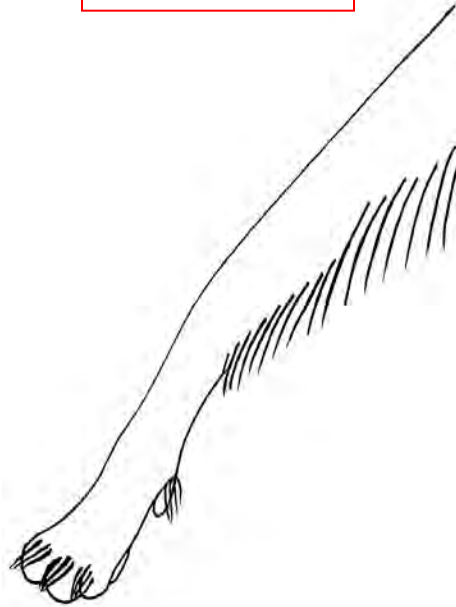
inner

outer

natural

ideal

abstract



Lycopodium

Lycō + podium

wolf foot

natural



© 2000 Janet Novak



PATTERN CONCEPTUAL FRAMEWORK

outer

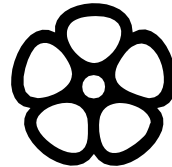
inner

outer

natural



ideal



abstract

Monotropa uniflora

Mono + tropa

one + turn

uni + flora

one + flower

PATTERN CONCEPTUAL FRAMEWORK

outer

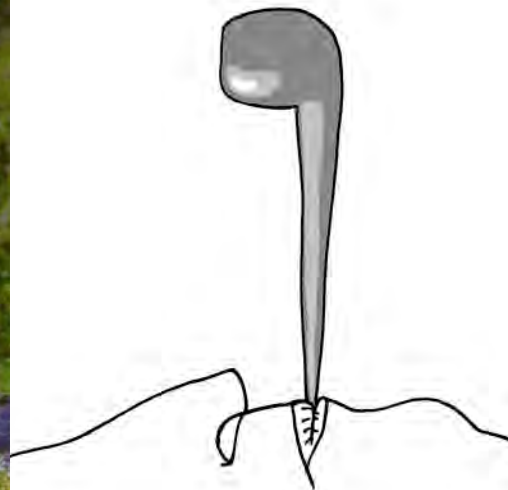
inner

outer

natural

ideal

abstract



Lnuitmaqne'l

Lnui + tmaqne'l

People's + pipe

PATTERN CONCEPTUAL FRAMEWORK

outer

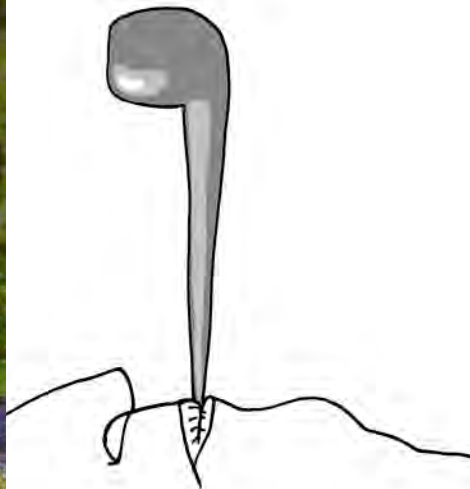
inner

outer

natural



ideal



abstract

Indian pipe

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



ghost plant

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Cornus canadensis

cornus

dogwood

canadensis

of Canada

PATTERN CONCEPTUAL FRAMEWORK

outer

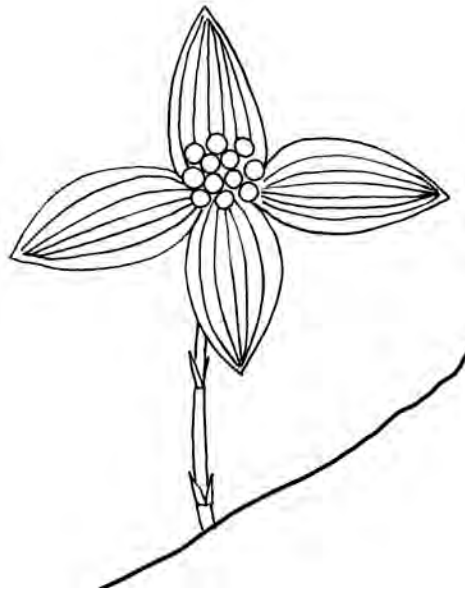
inner

outer

natural

ideal

abstract



Wso'manaqsil

wso' + manaqsil

incline + plant

PATTERN CONCEPTUAL FRAMEWORK

outer

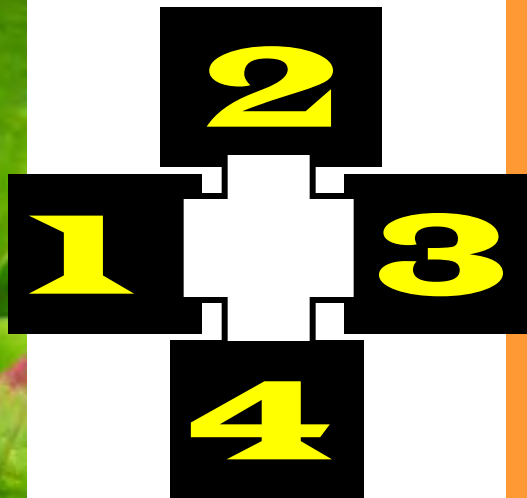
inner

outer

natural

ideal

abstract



quatre temps

four + times

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

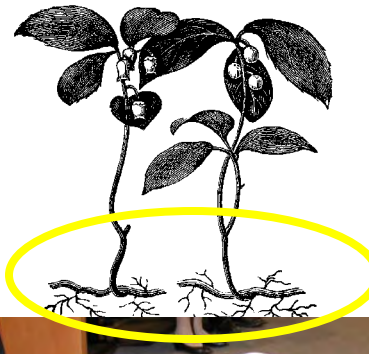
inner

outer

natural

ideal

abstract



Gaultheria procumbens

gaultheria

for J. F. Gaultier

Canadian physicist

procumbens

prostrate

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Kaqawejumanaqsi'l

Kaqawej

crow

uman + aqsi'l

berries + plant

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



tea berry

ground tea

Petit thé du bois

PATTERN CONCEPTUAL FRAMEWORK

outer

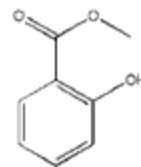
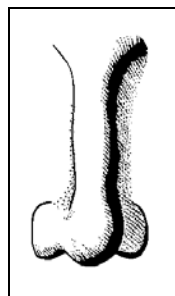
inner

outer

natural

ideal

abstract



wintergreen

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Epigaea repens

Epi + gaea

on + the earth

repens

creeping, crawling

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



trailing arbutus

arbutus

wild strawberry
tree

PATTERN CONCEPTUAL FRAMEWORK

outer

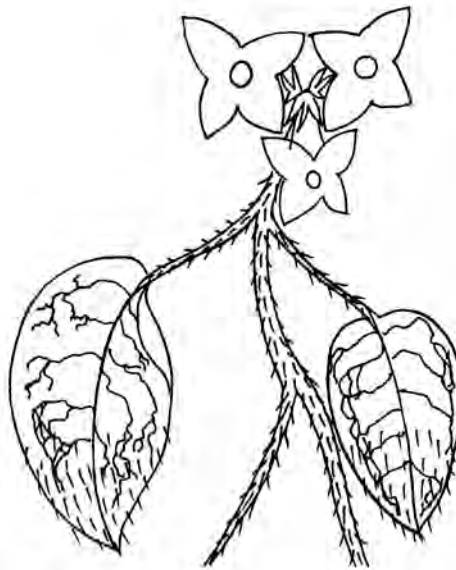
inner

outer

natural

ideal

abstract



Amaliaaltaqiaqwe'l

amali + altaqiaq

showy + creeping

we'l

thing

natural



© 2002 Janet Novak

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Aralia nudicaulis

Aralia

“Aralie”

nudi + caulis
naked + stem

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Wababa'kcigal

waba

white

ba'kcigal

?

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Wild sarsparilla

Salsepareille

like

Smilax regelii

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



1



2

3

Coptis trifolium

coptis

cut

trifolium

three leaves

PATTERN CONCEPTUAL FRAMEWORK

outer

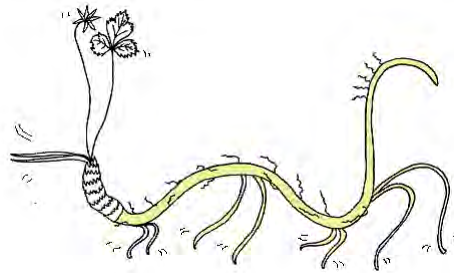
inner

outer

natural

ideal

abstract



Wisawtaqji'jkl

wisaw + taq
golden spreading

+ ji'jkl
little things

PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



Goldthread

natural



PATTERN CONCEPTUAL FRAMEWORK

outer

inner

outer

natural

ideal

abstract



wild-lily-of-the-valley

like Convallaria majalis

(Europe, Asia, Eastern U.S.)

PATTERN CONCEPTUAL FRAMEWORK

outer

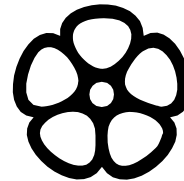
inner

outer

natural

ideal

abstract



Maianthemum
canadense

Mai + anthem
may + flower

canadense
of Canada

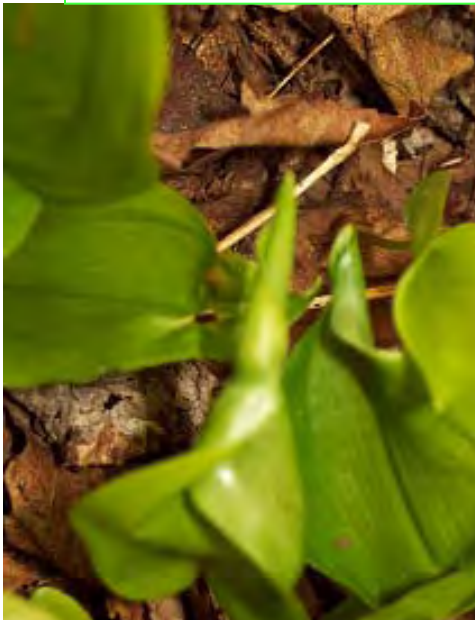
PATTERN CONCEPTUAL FRAMEWORK

outer

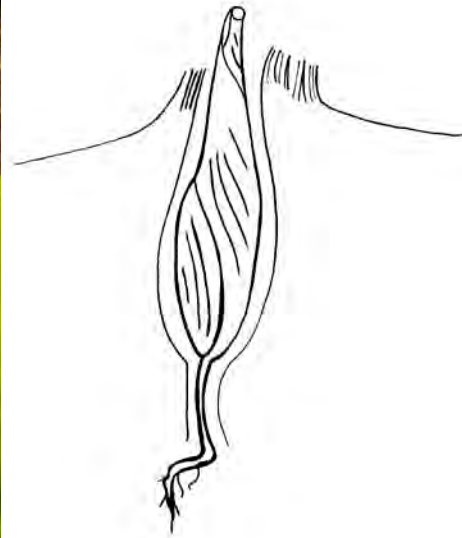
inner

outer

natural



ideal



abstract

Sapoqwqanipako'sit

sapoq
*it pokes up
through despite*

wqani
from earth

pako'sit
rolled up leaves

Comparative Big Picture Perspectives on the Environment




the strengths
of Aboriginal
knowledge



the strengths
of Western
knowledge


ABORIGINAL WORLDVIEW




Mi'kmaq language and
Indigenous Science

Eco-reflective and
participatory

Sense of connectedness
with one's environment



WESTERN WORLDVIEW

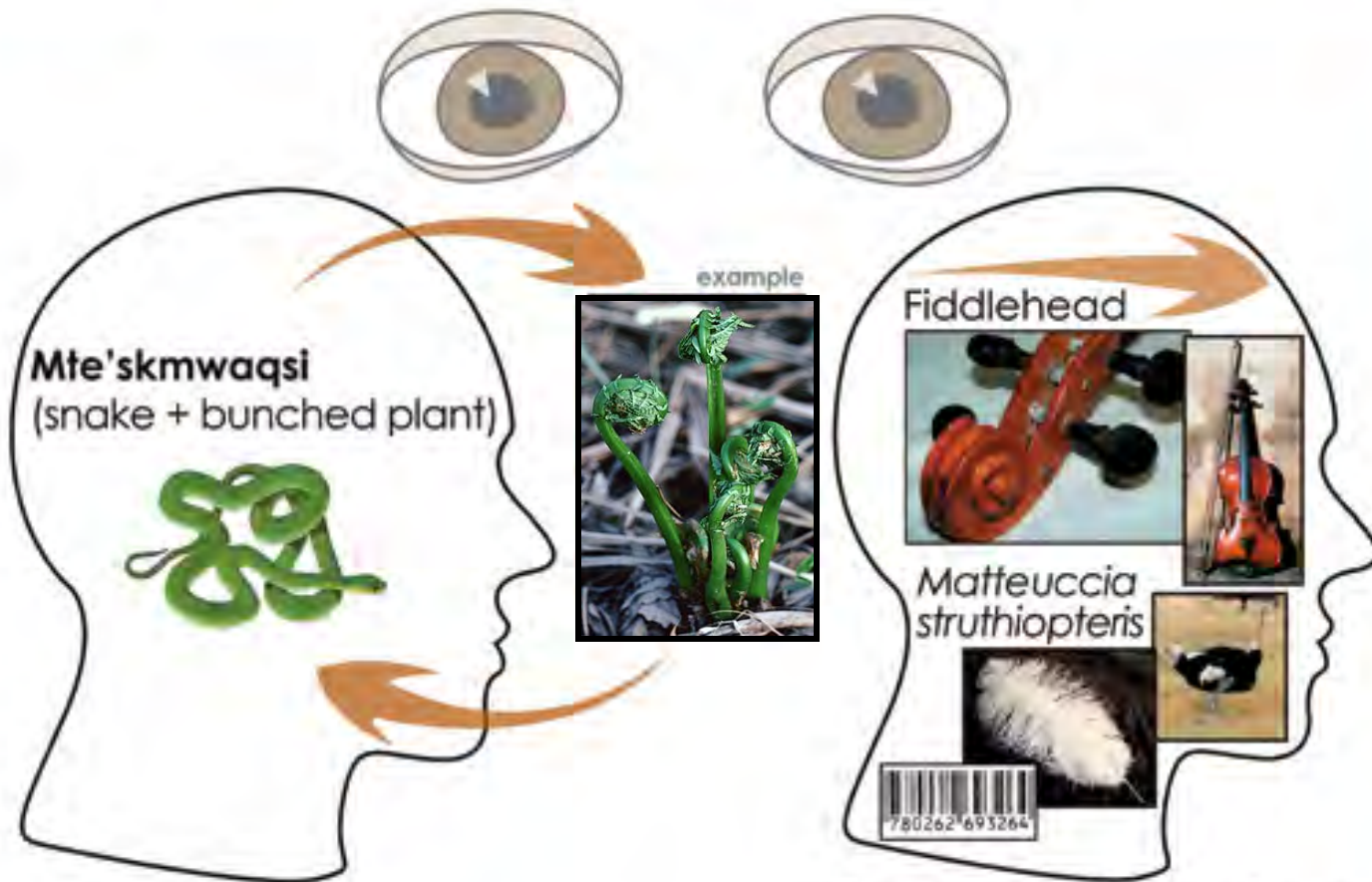


English language and
Western Science

Cogno-centric and
detached

Sense of disconnectedness
from one's environment

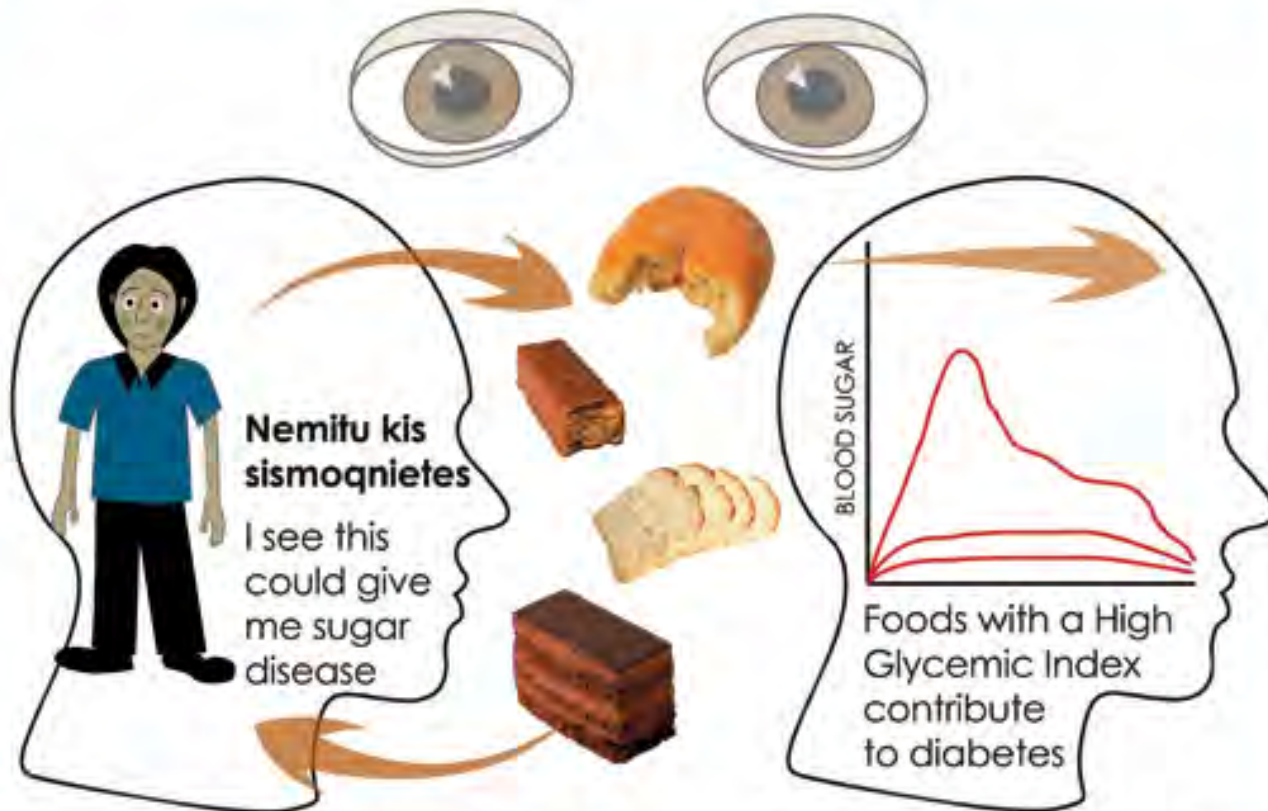
Seeing relationships: plant names and my environment



The eco-reflective Mi'kmaq plant name describes the fern in terms of the relationship between it and another living being present in the same local environment, a snake.

The cogno-centric Western plant names describe the fern in terms of symbolic objects, organisms, and even numbers that might reflect the patterns of the plants but that are not related to the local environment. The barcode exemplifies extreme detachment from environment.

Seeing relationships to promote healthy lifestyles: my thoughts, my health, and my environment



The relational Mi'kmaq phrase *Nemitu kis sismoqnietes* (I see this could give me sugar disease) describes health information in terms of the relationship between self and food (in one's environment). This participatory and eco-reflective understanding makes one's personal role and responsibility in health easier to see and enact.

The Western Science understanding focuses on blood sugar, which must be determined by an instrument. Furthermore, the technical term "Glycemic Index" lacks meaning for most people; thus, the responsibility they have with respect to food choices and their health is not immediately apparent.

Seeing relationships to promote healthy lifestyles: my thoughts, my health, and my environment



The relational Mi'kmaq phrase *lapju nemitu kis opla'lates mijuajij* (I see this could seriously harm my baby) demonstrates an understanding of health information based on personal action, relationships and responsibilities.

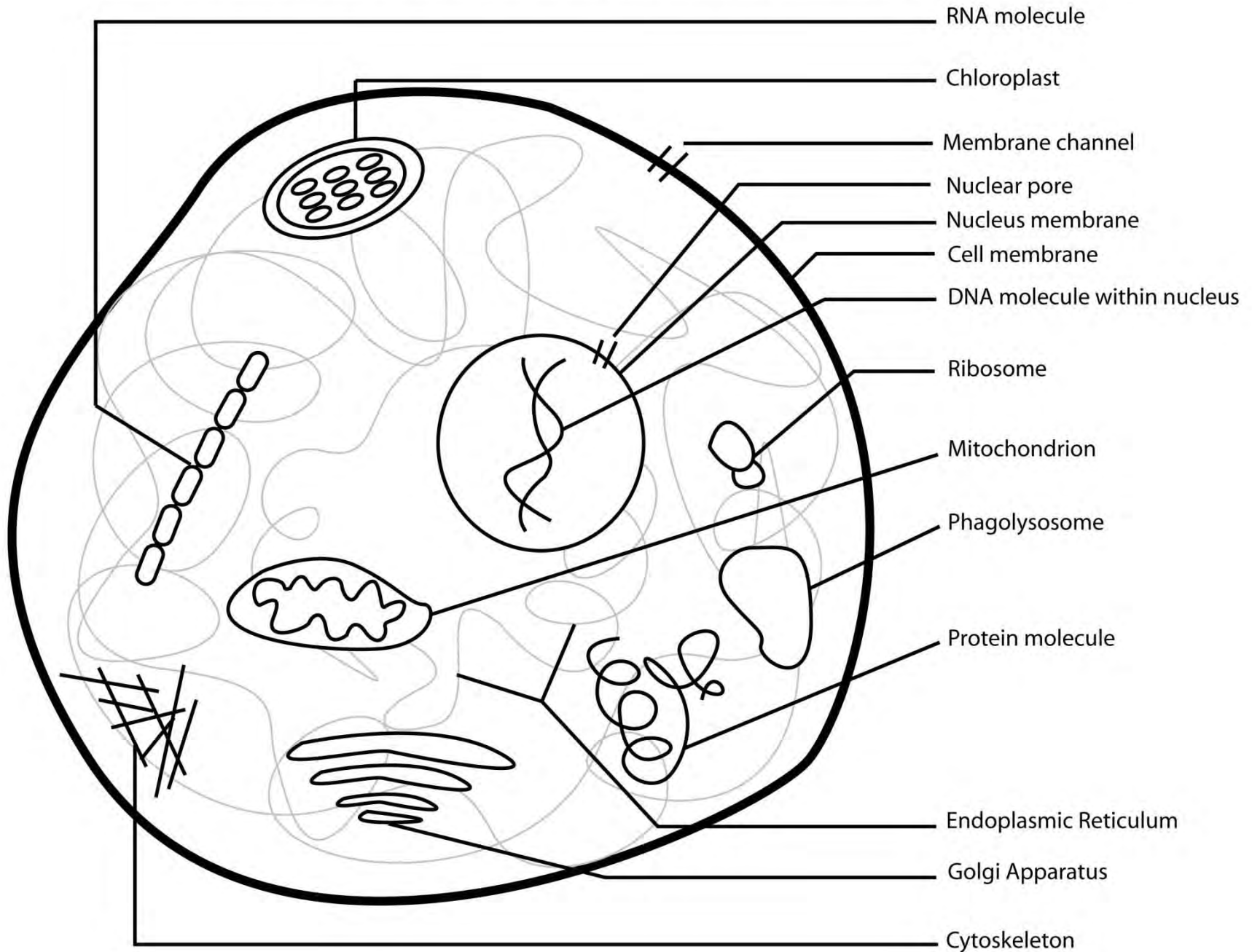
The Western Science understanding labels a condition but not the human or environmental relationships that can contribute to health problems. This explanation is more abstract, quite static, and much less participatory.

Blondie

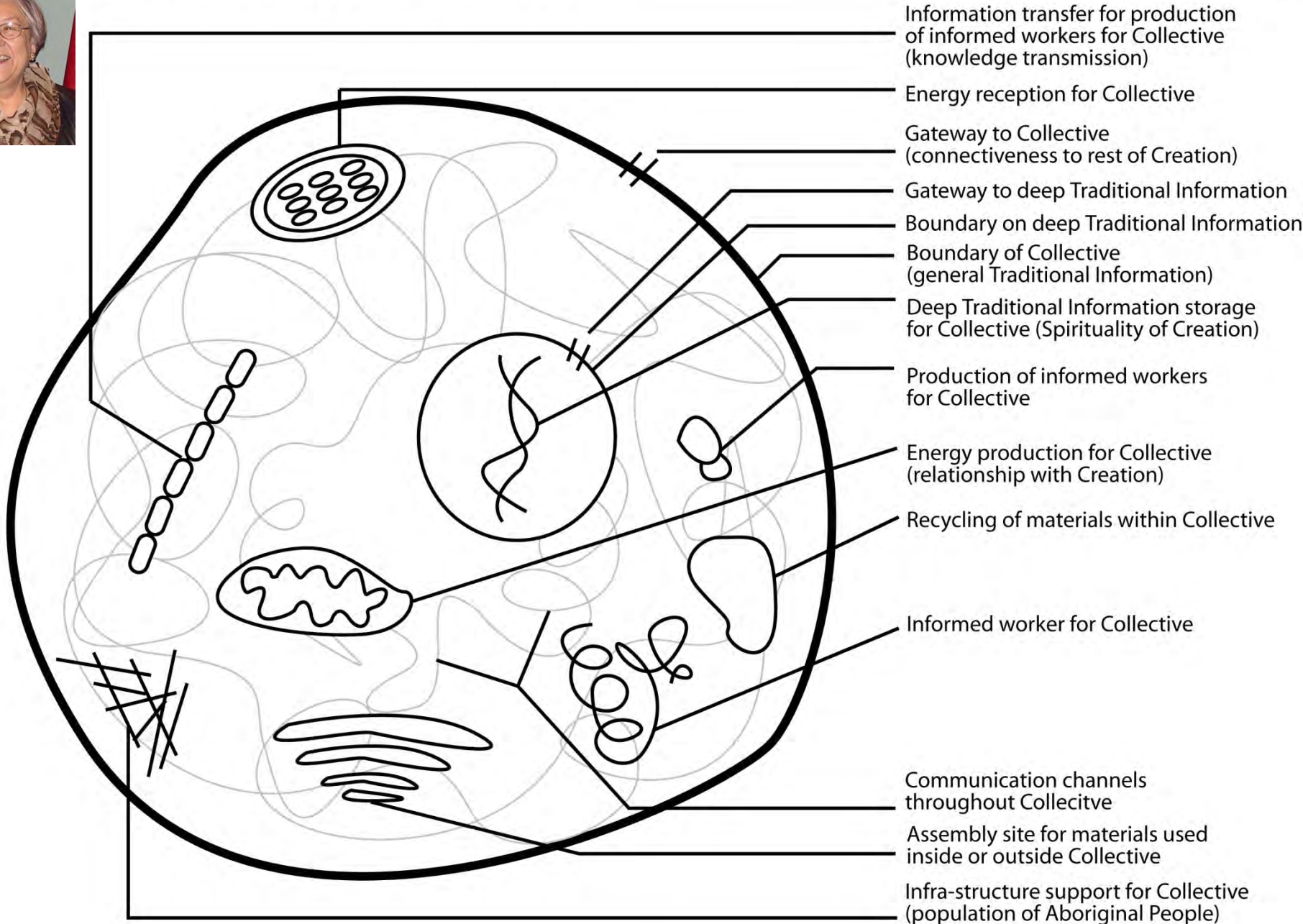


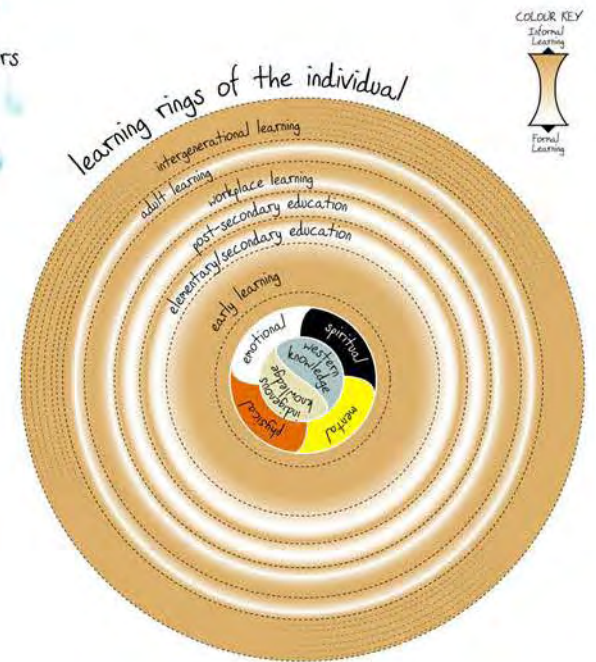
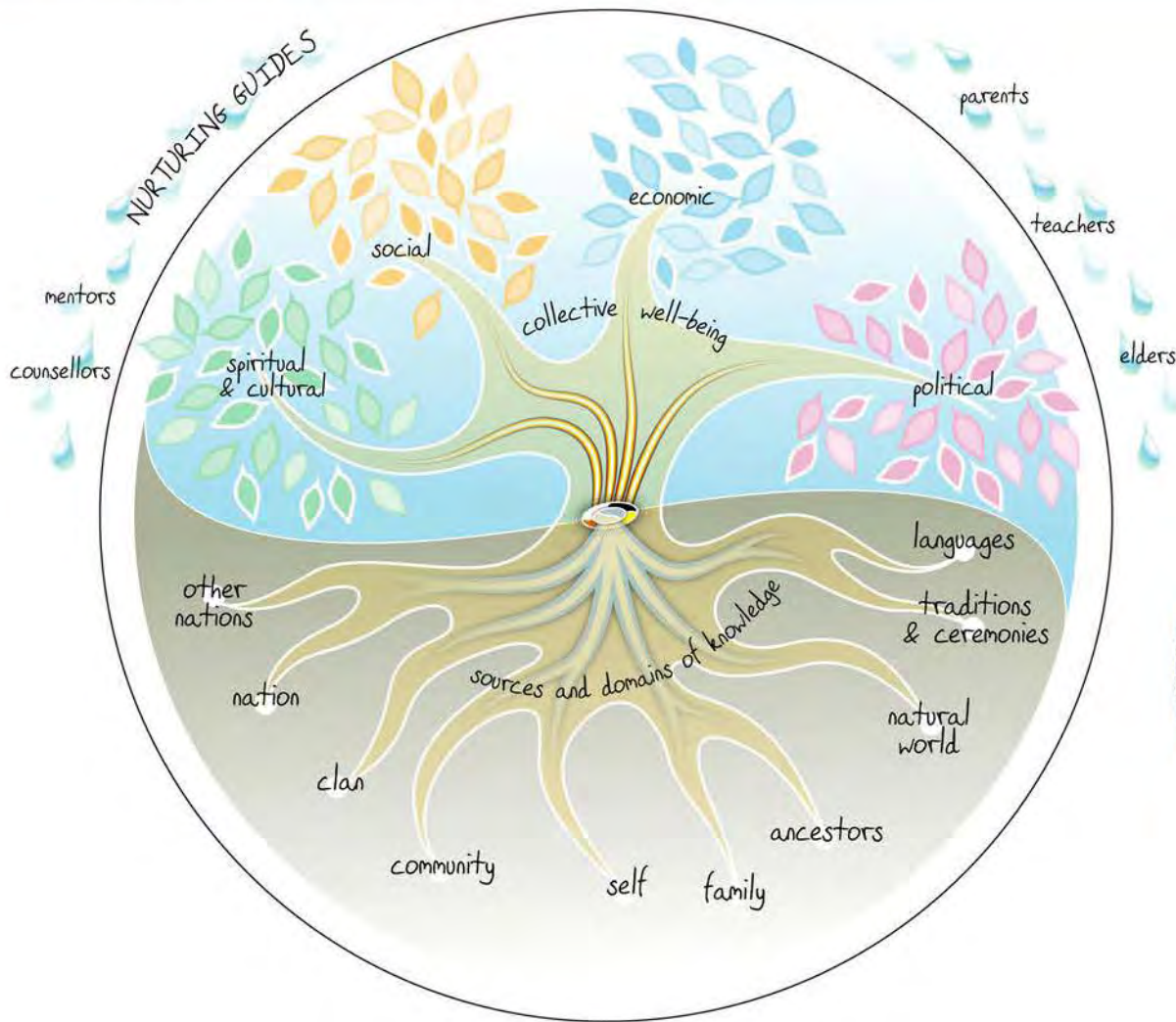
not a visual pattern “that works” in North America
at the time in the day
that children go door-to-door for Halloween candy

The Collective: Its Parts (example = the living cell)



The Collective: Its Functions (by Murdena Marshall BA, MEd)

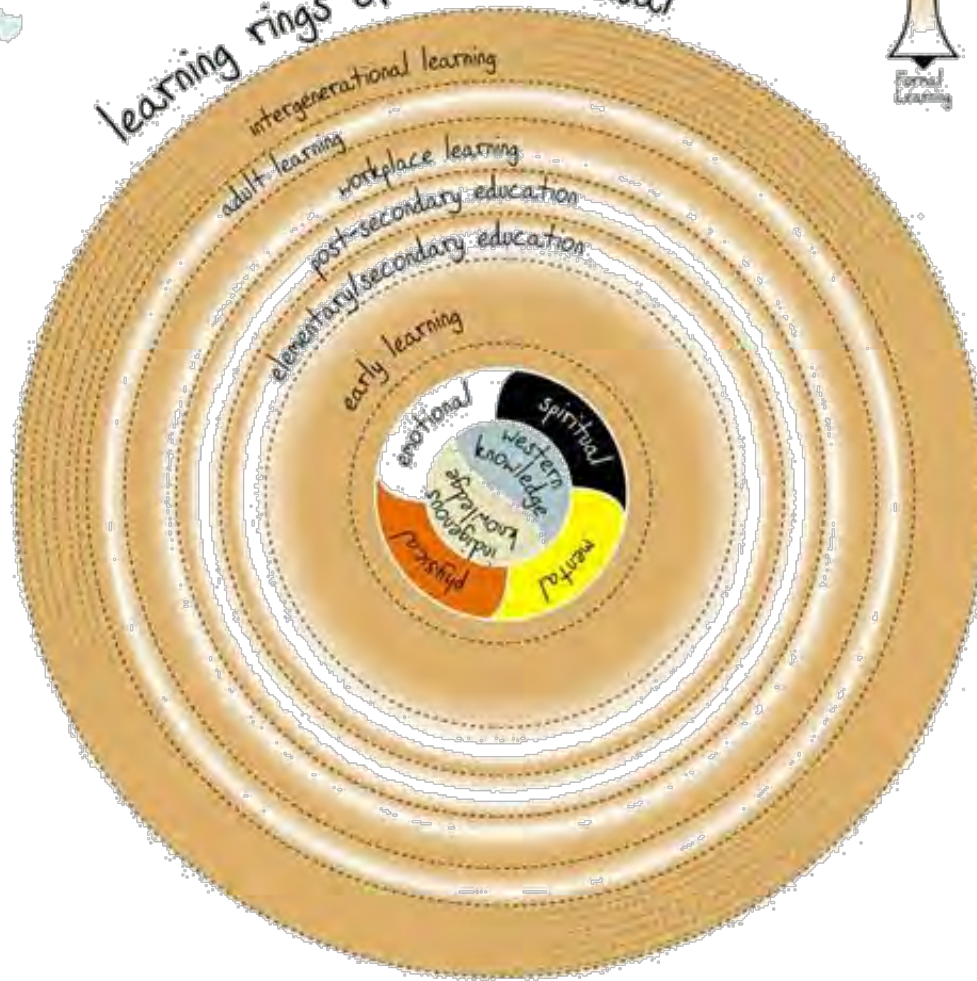




rs



learning rings of the individual



COLOUR KEY

Informal Learning



Formal Learning



Aboriginal Learning Knowledge Centre – Canadian Council on Learning

Integrative Science



Indigenous

Western

“bringing our sciences together”

Canada Research Chairs / Chaires de recherche du Canada / Canada

Social Sciences and Humanities Research Council of Canada / Conseil de recherches en sciences humaines du Canada

Canada Foundation for Innovation / Fondation canadienne pour l'innovation

CAPE BRETON UNIVERSITY



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IWK Health Centre Foundation

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NSERC CRSNG

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Eskasoni Detachment Royal Canadian Mounted Police / Gendarmerie royale du Canada