Image Schema Groups

organised regarding their potential for the design of data physicalisations

force

can enhance the design of more (inter)active data physicalisations

process

can enhance the design of more (inter)active data physicalisations

level 3

attribute

address properties of objects and bear potential to address different sensory modalities

multiplicity

address position and relation of objects in physical space and among each other

space

address position and relation of objects in physical space and among each other

containment

address position and relation of objects in physical space and among each other

level 2

basic

appear in every physicalisation, can be enriched with data, meaning and properties

level 1

Image Schema Groups

organised regarding their potential for the design of data physicalisations

force

attraction
balance
blockage
compulsion
counterforce
diversion

enablement
momentum
resistance
restraint removal
self motion
locomotion

process

cycle
iteration
superimposition

level 3

attribute

big–small
bright–dark
fast–slow
hard–soft
heavy–light
straight
strong–weak
warm–cold
good taste–bad taste
painful
smooth–rough
clean–dirty

multiplicity

collection
count–mass
linkage
matching
merging
part–whole
splitting

space

center–periphery
contact
front–back
left–right
location
near–far
path
scale
up–down
rotation

containment

container
content
full–empty
in–out
surface

level 2

basic

object
substance

level 1

basic

Image Schemas and Metaphors

appear in every physicalisation,
can be enriched with data,
meaning and properties

object

`material thing that can be seen and touched [Oxford Dictionary of English]`

`objects can also be seen as bounded entites toward which thought, feeling, or action is directed`

- opportunities are objects
- existence is an object
- ideas are objects
  ideas are solid objects
- meanings are objects
- time is an object
  time is a moving object
- time passing is motion of an object
- time passing is an observer's motion over a landscape
- properties are possessions
- attributes are possessions
- theories are constructed objects
- the mind is a brittle object
- anger / being angry is a sharp object
- fear / being afraid is a sharp object
- fear / being afraid is an incomplete object

- happiness / being happy is a destroyable object
- disgust / being disgusted is a sharp object
- disgust / being disgusted is a heavy object
- race is a object
- wealth is a hidden object
- problems are solid objects
- problem is a constructed object
- Abstrakta sind Objekte / Substanzen
- external events are large, moving objects
- purposes are desired objects
- distress is an object

substance

`unbound homogenous regions of material`

- laughter is a substance
- vitality is a substance
- sprinting is a substance
- anger / being angry is a mixed or pure substance
- happiness / being happy is a mixed or pure substance
- sadness / being sad is a mixed / pure substance
- disgust / being disgusted is a mixed / pure substance
- force is a substance directed at an affected party
- force is a substance contained in affecting causes

basic

attribute

Image Schemas and Metaphors

address properties of objects and
bear potential to address
different sensory modalities

big-small

of considerable size or extent

larger than other items of the same kind versus of a size that
is less than normal or usual [Oxford Dictionary of English]

- importance is size
  important is big
- amount is length
  amount is size
  more is bigger
- value is size
- significant is big
- viel is Höhe / Größe
- Intensität ist Höhe / Größe
- wenig ist unten / klein
- Macht / Bedeutung / Einfluss ist
  Höhe / Größe
- Mangel an Bedeutung ist klein / unten
- large amount of knowledge is large area
- high pitch is small – low pitch is big
- Zunahme ist Wachstum
- behaving morally is contracted,
  behaving unmorally is expansive

bright-dark

`bright: emitting or reflecting light readily or in large amounts`

`dark: devoid of or deficient in light or brightness; shadowed or black (having dark hue when used with colours) [wordnet.princeton.edu]`

- negative is dark, positive/goodness is bright
- happiness is brightness, happiness / being happy is light
- sadness / being sad is dark
- anger / being angry is light
  anger / being angry is darkness
- fear / being afraid is light
  fear / being afraid is dark
- spiritual knowledge is light –
  spiritual ignorance is darkness
- faith is light – rejection of faith is darkness
- superior achievements are bright
- intelligent is bright
- light is bright – heavy is dark
- moral is bright – immoral is dark
- distress is absence of light in part of the body
  experiencing distress is darkness

attribute

fast-slow

- speed of action is speed of movement

hard–soft

```
hard: solid, firm, and rigid; not easily broken, bent, or pierced

soft: easy to mould, cut, compress, or fold; not hard or firm to the touch
[Oxford Dictionary of English]
```

- physical strength is hardness
- requiring a great deal of endurance or effort is hard
- reliable, especially because based on something true or substantiated is hard
- very potent, powerful, or intense is hard – the opposite is soft
- difficult is hard
- unpleasat is hard – pleasant is soft
- near is hard
- stressful is hard – relaxing is soft
- insensitive is hard – sensitive is soft
- fearless is hard – fearful is soft
- abrupt is hard – continous is soft
- strict is hard – flexible is soft
- certain is hard – uncertain is soft
- male is tough – female is tender
- sympathy is softness

heavy-light

- amount is weight
- Probleme sind schwer
- Kosten sind schwer
- Schulden sind schwer
- Verantwortung / Schuld ist schwer
- schlimme / ernste Sachverhalte sind schwer
- important is heavy
- bedeutende / wichtige Personen oder Abstrakta sind schwer
- sadness / being sad is a burden
- stress is heavy

straight

extending or moving uniformly in one direction only;
without a curve or bend [Oxford Dictionary of English]

- morality is a straight path
- god's way is a straight path
- evil ways are crooked
- virtue is straight
- dishonesty is crookedness
- correct is straight – incorrect is crooked
- legal is straight – illegal is crooked
- aggression is a straight edge
- cold is straight – warm is round

attribute

strong–weak

- more is strong
- power is physical strength
- gute ökonomische Lage ist physische Stärke
- ökonomische / soziale Benachteilung ist Schwäche
- confident is strong – shy is weak
- halthy is strong – ill is weak
- decided is strong – hesistant is weak
- male is strong – female is weak

attribute

warm-cold

- affection is warmth
- Emotionalität ist Wärme
- Konflikt ist Feuer
- anger / being angry is heat
  anger / being angry is cold
- fear / being afraid is heat
  fear / being afraid is cold
- happiness / being happy is warm,
  happiness / being happy is heat / fire
- sadness / being sad is lack of heat
- disgust / being disgusted is cold
  disgust / being disgusted is heat
- intensity is heat
- close is warm, affection is wamth
- concrete language is warm – abstract
  language is cold
- red is warm – blue is cold
- experiencing distress is feeling cold

- conflict is heat
- critisising is roasting
- unpleasant questioning is grilling

good taste–bad taste

- negative Erfahrunge haben einen schlechten Geschmack
- bad is stinky
- romantic feelings are sweet
- sweet taste is agreeable
- unmorality is a bad taste
- interesting information is juicy – uninteresting information is dry
- profitable is juicy
- unfriendly is acidic
- unhappy / bad-tempered is sour
- unsuccessful is sour
- angry is bitter
- pleasant is sweet
- interesting is spicy

painful

- negative Erfahrungen sind schmerzhaft
- fear / being afraid is pain
- disgust / being disgusted is pain

smooth-rough

smooth: having an even and regular surface; free from perceptible projections, lumps, or indentations

rough: having an uneven or irregular surface; not smooth or level [Oxford Dictionary of English]

- boring is smooth – dangerous is rough
- social coordination is smooth – uncoordinated is rough

clean–dirty

- moral is clean – immoral is dirty

multiplicity

Image Schemas and Metaphors

address position and relation of
objects in physical space and
among each other

collection

several things grouped together or considered as a whole
[wordnet.princeton.edu]

- arithmetic is object collection

count-mass

count: denotes a set of discrete items with a network of divisional spacing

mass: is a coherent whole without internal differentiation
[Talmy, 1983]

multiplicity

linkage

two or more entities which are connected with each other by means
of a linking device of some kind

- love is a bond
- social relationships are links

multiplicity

matching

corresponding in pattern, colour, or design; complementary
[Oxford Dictionary of English]

- good is homogenous – bad is heterogenous
- excitement is heterogenous – calm is homogenous
- noisy is heterogenous – quiet is homogenous

multiplicity

merging

- the polin extension of arithmetic is object collection
- the fitting together extension of arithmetic is object construction

multiplicity

part-whole

`consists of a whole, parts, and a configuration`

- coherent is whole
- love is a unity (of two complementary parts)
- arithmetic is object construction

splitting

`creates (two or more) autonomous entities out of a whole`

- Mangel an Übereinstimmung ist Trennung durch topographische Hindernisse
- destruction is splitting
- the splitting extension of arithmetic is object collection
- arithmetic is object construction
- experiencing distress is being brittle

multiplicity

space

Image Schemas and Metaphors

address position and relation of
objects in physical space and
among each other

center-periphery

`consists of an entity, a center, and a periphery`

- importance is centrality
- unimportant issues are given peripheral positions
- identity is central
- distress is being in the centre

contact

`the physical coming together of two or more things`
`[wordnet.princeton.edu]`

- emotional effect is physical contact
- emotional intimacy is established by physical contact,
  type of emotional effect is (determined by) manner of contact,
  avoiding emotional effect is avoiding contact
- communication is established by physical contact

space

front–back

```
front: the side that is forward or prominent; the side that is seen or that goes first;

back: the side that goes last or is not normally seen; the part of something that is
furthest from the normal viewer
[wordnet.princeton.edu]
```

- future is in front, past is behind future is behind, past is in front
- progress is forward movement – undoing progress is backward movement
- success is front – failure is back
- active is front – passive is back
- important is front – unimportant is back
- novel is front – old-fashioned is back
- close places are in front – distant places are behind
- events happen more likely in front – events happen less likely behind
- official hearing is in front
- considered is front – not considered is back

space

left-right

```
left: being or located on or directed toward the side of the body to the
west when facing north

right: being or located on or directed toward the side of the body to the
east when facing north
[wordnet.princeton.edu]
```

- conservaitve is right – social-democratic is left
- past is left/right – future is right/left
- bad is left – good is right (i.e. dominant side is good)
- small is left – big is right
- moral is right – immoral is left
- less is left – more is right

location

A particular place or position
[Oxford Dictionary of English]

- states/emotions are locations
- change of state is change of location
- subjects are areas
- status is position
- existence is a location
- creating is moving to a location
- emotional stability is maintaining position
- a problem is a region in a landscape
- an action is being in a location

space

near-far

`a topological abstraction related to the spatial proximity`
`and distance of entities or sets of entities`

- similarity is closeness
  difference between is distance between
- items to be considered are spatially close
- emotional intimacy / affection is
  physical closeness
- affiliation is closeness
- good is near – bad is far
- Übereinstimmung ist räumliche
  Nähe – Mangel an Übereinstimmung ist
  räumliche Distanz
- relationships are enclosures
- affection is closeness
- familiar is near – unfamiliar is far
- time is something moving toward you
- strength of effect is closeness
- narrative absorption is being close
- the present is near – the past is far
- emotional is near – unemotional is far

- important is near – unimportant is far
- more is far - less is near

space

path

```
consists of a source or starting point, a goal or end-point, and a sequence
of contiguous locations connecting the source with the goal
[Johnson, 1987:113]
```

- means for acieving purposes are paths,
  means of change of state is path,
  means of change of action is path,
  change in means is change in orientation
- purposes are destinations – lack of purpose is
  lack of direction
- time is a path
- live is a journey
- love is a journey
- career is a journey
- opportunities are open paths
- linear scales are paths
- reasoning is following a path
- argument is a journey
  an argument defines a path
  argumehts are paths on which though travels
- being better in a dynamic situation is being
  farther along on a path
- journey defines a path

- understanding is arriving
- leading a moral life is making a journey
  on god's way
- god's commandments are a path
- sinning is deviating/swerving from
  god's path
- thinking is a journey
- science is a journey
- important position is guidance on a path
- development is a path
- long-term purposeful activities
  are journeys
- progress is distance travelled – lack of pro-
  gress is lack of movement
- success is reaching the end of the path
- arithmetic is motion along a path
- narrative absorption is movement on a path

up-down

a topological abstraction related to the spatial proximity and
distance of entities or sets of entities

- more is up – less is down
- anger / being angry is high / low (intensity)
- fear / being afraid is high / low (intensity)
- more is higher
  being better in a static situation is being
  above (more is up)
- good is up – bad is down (quality)
- good is up – bad is down (good, valence)
- god's way leads upwards
- better rank is higher on list – lower rank is
  lower on list
- high status is up – low status is down; status
  is positon
- Karriere ist Aufwärtsbewegung
- power is up, having control or force is up,
  being subject to control or force is down
- happy is up – sad is down
- sadness / being sad is depth
- foreseeable future events are up / and ahead

- health and life are up – sickness and death
  are down
- harming is lowering (well-being is up)
- conscious is up – unconscious is down
- rational is up – emotional is down
- virtue/morality is up – depravity/immorality
  is down
- unknown is up – known is down
- importance is depth
- intellectual quality is depth of thinking
- excitement/euphoric states are up – calm
  is down
- failure is falling/going down
- high pitch is up – low pitch is down
- high volume is up – low volume is down
- light is up heavy is down
- fast is up – slow is down
- energetic is up – lazy is down
- strong is up – weak is down
- noisy is up – quiet is down

space

scale

builds on the path image schema with added cumulativity, normativity, and fixed directionality. It is used to refer to numbers of objects, amounts of substances, degrees of force, or intensities of sensations. ... it might not be a foundational image schema because it appears to be a compound one

space

rotation

- metaphoric Blend Multiplication by -1 is rotation

containment

Image Schemas and Metaphors

address position and relation of
objects in physical space and
among each other

container

`consists of a boundary that separates an interior (space enclosed by the boundary) from the exterior (the surrounding area – space not enclosed by the boundary) and, often, a portal (an opening in the boundary that allows motion between the interior and the exterior) [Dodge & Lakoff, 2005:62]`

- obligations / agreements are containers
- a time period is a container
- the mind (consciousness) is a container (for idea objects), understanding is taking idea-objects into the mind-container, intellectual receptivity is openness and spaciousness of the mind-container
- memory is a container for objects
  the memory is a store to keep idea-objects in
- the eyes are containers for the emotions
- the visual field is a container
- the body/mind/a persond is a container for the self
  the body is a container for emotions
- emotions are containers
- shapes are containers
- investments are containers for money
- difficulties are containers
- a problem is a locked container for its solution
  the open problem-container has to be searched for its solution-contents

- solving a problem is taking the solution-contents out of the problem-conteiner
- linguistic expressions are containers for meanings
- categories are containers
- race as container object
- existence is presence in a container
- an argument is a container
- the world is a container
- geographic regions are containers
- time periods are containers
- living conditions / personal circumstances are containers
- groups of individuals are containers
- work domains are containers
- markets are containers
- a company is a container
- reasonable behaviour is a bounded area
- being restricted is being in a container
- nature is a container
- distress is a container

containment

content

describes everything that is inside a container

- physical and emotional states are entities within a person
- anger / being angry is hot fluid in a container
  anger / being angry is a substance in a container (under pressure)
- fear / being afraid is fluid in a container
  fear / being afraid is a substance in a container (under pressure)
- happiness / being happy is fluid in a container
  happiness / being happy is a substance in a container(under pressure)
- sadness / being sad is fluid in a container
  sadness / being sad is a substance in a container (under pressure)
- disgust / being disgusted ist a substance in a container (under pressure)
- abilites are the content of a person-container
- distress is content

containment

full-empty

`used to describe the fill level of a container`

- distress is emptiness

in-out

denotes the location of an entity within or outside of a container/bounded
area or the movement into or out of a container

- ideas out of the mind are entites out of a container
- narrative absorption is being in a media container
- merging is in – separating is out
- contraction is in – expansion is out
- engaging is in – withdrawal is out
- goals/results are in
- resource is out
- attraction is in
- beginning is out
- completing is out
- constrained is in – unconstrained is out
- accessible is in/out

containment

surface

```
denotes a two-dimensional, often flat, area;
often it denotes the outside of a material body
```

- the path of a journey is a surface
- the path of an argument is a surface
- theories are covering surfaces for the facts
- external appearance is a surface
- darkness is a covering surface

containment

force

Image Schemas and Metaphors

can enhance the design of
more (inter)active
data physicalisations

attraction

a force image schema in which a (passive) object exerts a force on another object,
either physically or metaphorically, to pull it toward itself (or in the case of
repulsion to repel it), mostly acting from a distance

- desires that control action are external forces that control motion
- inclinations toward intimacy are forces toward closeness
- narrative absoption is attraction

force

balance

`a force image schema that provides an understanding of physical or metaphorical counteracting forces: forces and/or weights counteract/balance off one another. Metaphorically, there is equilibrium, not "too much" and not "not enough"`

- emotional stability is balance – distress is imbalance
- comparison of importance is weighing
- judging diverse arguments is weighing up idea-objcts
- ambivalent is moving from side to side – univalent is balanced
- balance is good – imbalance is bad

force

blockage

a force image schema in which a force / movement is physically or
metaphorically stopped or redirected by an obstacle

- impediments to actioin are impediemnts to motion
- evil ways are full of obstacles
- fear / being afraid is a barrier
- problems are obstacles on the path
- inability to act is inability to move
- distress is blockage

force

compulsion

a force image schema that involves an external force physically or metaphorically
causing some passive entity to move

- forced action is forced motion

counterforce

a force image schema that involves the active meeting of physically or metaphorically opposing forces that are equally strong. Both forces collide, there is no further movement

force

diversion

a force image schema that involves forces that physically or metaphorically meet
and produce a change in direction or force vectors (at least one)

- change of state is change of direction
  unexpected change is diversion form a normal state of affairs or course of events
  unexpected state is diversion from expected changes

force

enablement

a force image schema that involves having (a) the physical or metaphorical power to perform some act, or a potential force (vector) and the absence of blockage, resistance, counterforce, compulsion; (b) a "felt sense of power to perform some action"

- aids to action are aids to motion
- guided action is guided motion

force

momentum

force image schema that involves the tendency of an object to maintain the actual
state of motion (or rest) if there is no influence of another agent

- the force of progress is momentum

resistance

`a force image schema that involves a force that tends to oppose or retard the`
`motion of another entity`

- impediments to action are impediments to motion

force

restraint removal

a force image schema that involves the physical or metaphorical removal of a barrier
to the action of a force, or absence of a barrier that was potentially present

force

self-motion

occurs when a resting entity starts moving without any forces acting on it

force

locomotion

- Handeln / Aktion ist Bewegung
- Fortschritt is Vorwärtsbewegung auf einem Weg
- Vorwärtsbewegung / Rückwärstbewegung
- progress is motion forward
- changes are movements, change is motion
- causation is forced motion
- axtion is self-propelled motion
- time is motion
- social closeness is moving on towards someone
- achievement is moving forward

force

process

Image Schemas and Metaphors

can enhance the design of
more (inter)active
data physicalisations

cycle

Most fundamentally, a cycle is a temporal circle. The cycle begins with some initial state, proceeds through a sequence of connected events, and ends where it began, to start a new the recurring cyclic pattern. [Johnson, 1987, p. 119] ... not sure, however, whether this Image Schema is truly foundational, see the work of Barbara Tversky who could not show that people think in cycles but rather prefer linear paths.

process

iteration

repetition that is not the same each time, but that builds
on previous rounds

- the iteration extensoin of arithmetic is object collection
- the iteration extension of arithmetic is object construction
- the iteration extension of arithmetic is motion along a path

process

superimposition

process

source