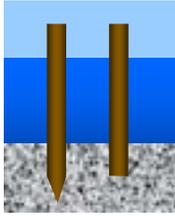


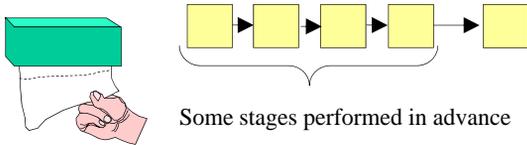
Separation in Time

Test for Separation in Time

I want the (pile) to be (**sharp**) while (driving). I want the (pile) to be (**blunt**) while (supporting). Must these critical conditions overlap in time? No, they do not have to overlap. Therefore we can separate in time.

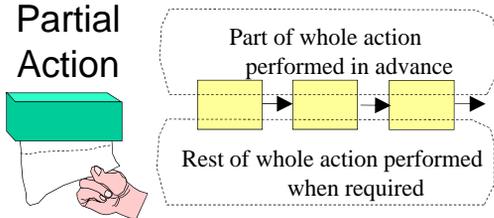


Prior Action



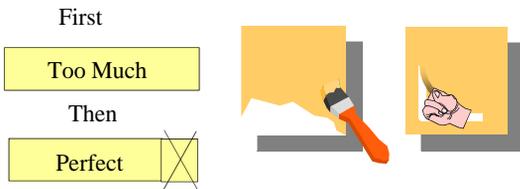
The contradiction is an action or function. (Tearing) of the (towel) can be broken down into steps. The steps of (holding and tearing) are performed during (any time previous to use) by (mechanical holding and tearing) in order to have (**tearing**). The remaining steps of (pulling the towel) are performed during (towel use) in order to have (**not tearing**).

Partial Action



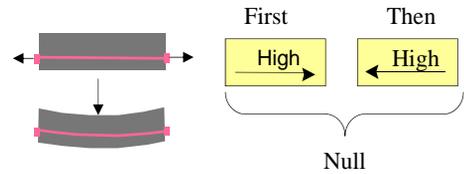
The contradiction attribute relates to an action or function. (**Tearing**) of the (towel) is partially performed in its entirety during (manufacture of the towel) by (perforating the towel) giving (**not tearing**). The function is completed during (towel use) by (pulling the towel) giving (tearing).

Excessive and Remedial Action



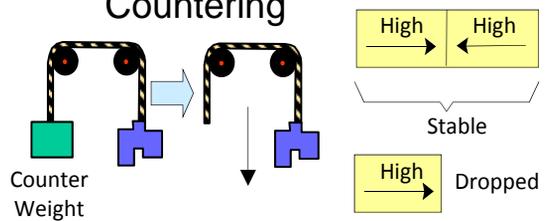
The contradiction attribute relates to an action or function that must be performed **rapidly** and **slowly**. The function of (painting) the (detailed parts) can be rapidly performed by the gross action of (painting with a roller or large brush). The detailed remedial action of (removing the excess paint) is made possible by (applying masking) in advance or by overflowing a (hydrophobic) threshold by (making the unpainted areas from hydrophobic materials.)

Prior Counter Action



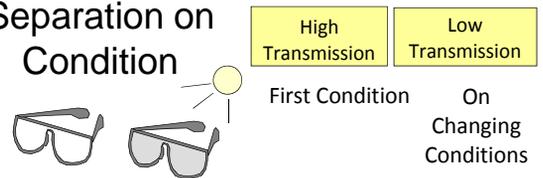
The harmful function of (tension loading) the (concrete span) cannot be avoided. The counter action of (applying a compression load) is performed in advance by (inserting steel columns under tension which "clamp" the span) so that when the time comes for the harmful action of (**tension loading**) the (concrete span) it is **not (tension loaded)**.

Counterweight



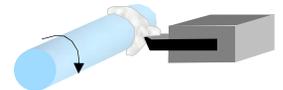
The contradiction attribute relates to an action or function. The (weight) must be (**null action—stable**) during (positioning). This is accomplished by applying (a counter weight or force). The counter action is removed during (dropping) when the **full action** is required.

Separation on Condition



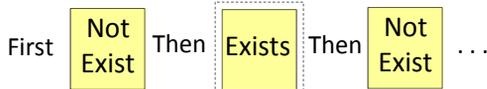
The difference of (light intensity) between (low lighting) and (intense lighting) will change the (glass's light transmission) from (**high transmission**) to (**low transmission**). The (photo sensitivity) will be exploited to drive the change of parameters.

Separation on Condition-Transparency



The difference of (inertia of force) between (large objects) and (small objects) will change the (separator material) transparency from **transparent** to **opaque**. The (inertia or relative force) will be exploited to drive the change of parameters.

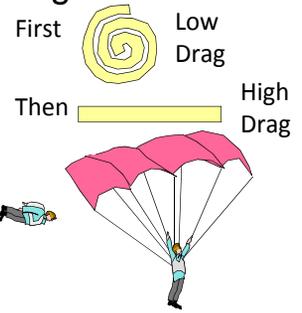
Transformation-Using Fields



Using (pneumatic structures) allows us to add a (pressure field) to the (display) during (displaying), making it (**exist**). (Removing) the (pressure field) during (storage) makes it (**not exist**).



Transformation-Unrolling / Stretching

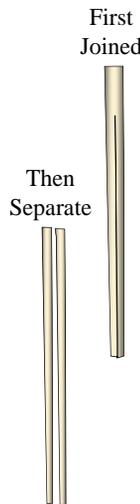


- Nesting Extenders
- Fabrics
- Extension Springs
- Constant Force Springs
- Shape Changing Molecules
- Nets
- Origami
- Scissoring Expanders

The (air brake) is formed from (fabric). The (air brake) is (compacted) during (freefall), thus making it (**low drag**). The (airbrake) is (expanded) during (braking), thus making it (**high drag**).

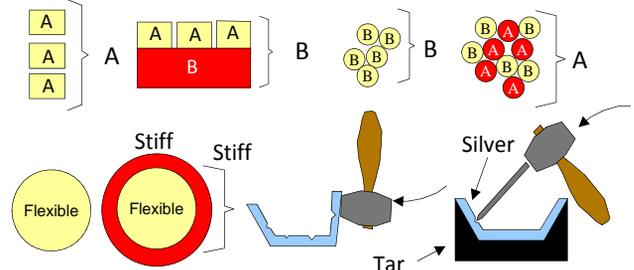
Transformation-Transformable States

- Solid to Liquid to Gas
- Combustible materials
- Fissable
- Adhesives
- Explosive
- Wettable
- Exothermic-Endothermic
- Soluble or dissolvable materials
- Foams
- Settable liquids--(increase of volume)
- Easily breakable or abraidable
- Polymerizing or de-polymerizing
- Mixture decomposition --Electrolysis
- Disassociation- recombination
- Shape Memory Materials
- Magnetic materials using Curie Effect
- Molecular reorganization (diamonds)



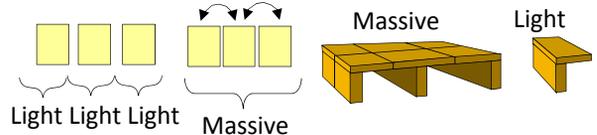
The (chopsticks) are formed from (an easily broken structure). The (chopsticks) are (unbroken) during (storage in vending machine) thus making them (**joined**). The (chopsticks) are (broken) during (preparation for consumption) thus making them (**separate**). (Breaking) is operated near (yield) by (creating a high stress crack initiation).

Carrier / Intermediary



During (engraving) (tar) which is (**stiff**) is (attached to, surrounding or mixed with) (individual or segmented) (plates) which are (**flexible**) thus loaning its property and making the combination (**stiff**). No carrier is used during (forming the plate) making the (plate) (**flexible**).

Merging—Interacting



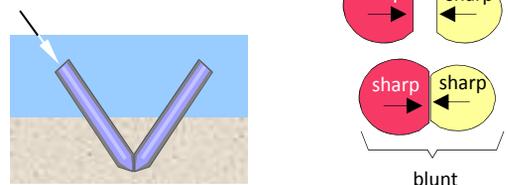
Segmentation is (allowed and accomplished by designing the table as separate pieces or not allowed). During (use) several (segmented or individual) (table pieces) have the property of being (**massive**) while unified or interacting through (an interlocking table or fastening elements). During (transportation) the unifying interaction is absent making them (**light**).

Transformation—Input / Output



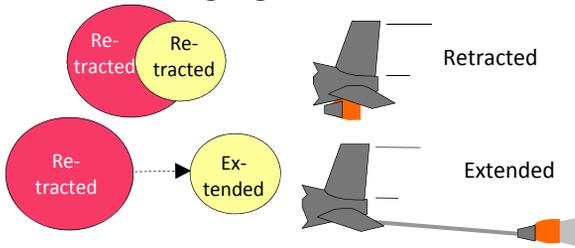
The (voice) to be operated upon must be (**male**) during (actual story telling). A transformation of (voice modulation) changes the (voice) to (**female**) during (transmission of the show).

Merging—Countering



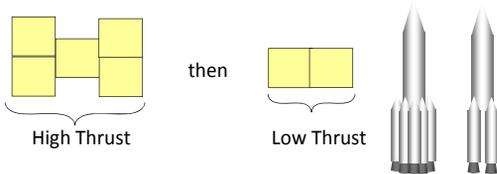
Elements are configured, oriented or designed to oppose each other by (orienting them to oppose each other). Separating the (piles) during (driving) makes them (**sharp**). During (supporting) the merged (piles) oppose each other making them (**blunt**).

Merging—Extraction



The (fueling system) has several identifiable pieces. During (refueling) the (intake nozzle) is separated making it (**ex-tended**). During (normal flight) the (intake nozzle) is reunited making it (**re-tracted**).

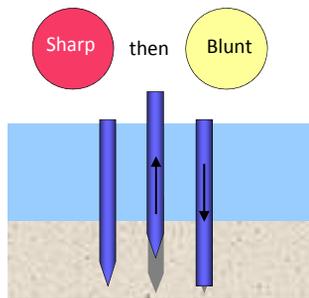
Merging—Adjustable Numbers



Multiple (thrusters) are available for adjustable use. During (large payloads) many (thrusters) are used to give (**high thrust**). During (small payloads) few elements are used to give (**low thrust**).

Rearranging—Two Objects

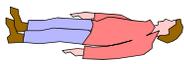
Two distinct (piles) are used. During (driving) the (**sharp**) one is used. During (supporting) the (**blunt**) one is used.



Copy or Facsimile

- Photographs
- Movies
- Paint Coverings
- Molds
- Time lapse photos
- Impressions

- Silhouettes
- Castings
- Resists
- Projections
- Computer Model
- Dummies



First Mannequins
(resilient)

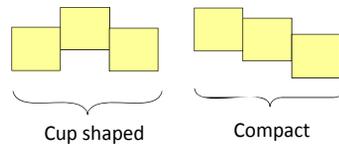


Then Real Victims
(fragile)

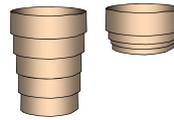
The (operation of the lungs and heart) of the (people) can be copied into a (mannequin). During (training) the (mannequin) is (**resilient**). During (emergencies) the (accident victim) is (**fragile**).

Rearranging—Reorienting

Pieces

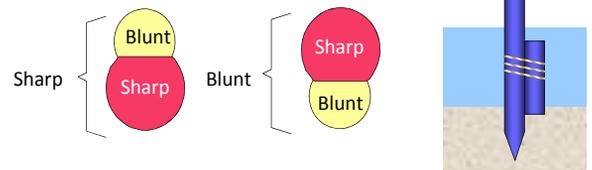


Hinged
Unfolding
Origami
Nesting



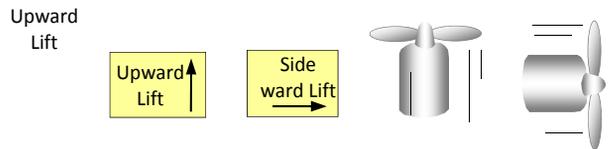
(Segmented cup pieces) are coordinated together. During (storage and transportation) the pieces are oriented so that they are collectively (**compact**). During (drinking) the pieces are oriented so that they are collectively (**cup-shaped**).

Rearranging—Reorienting Attachments



Two (piles) which are (**sharp**) and (**blunt**) are attached to each other. During (driving) the pieces are oriented so that (**sharp**) comes into play. During (supporting) the pieces are oriented so that (**blunt**) comes into play.

Rearranging—Changing Directions



Changing directions of the (propeller) allows the setting to be changed. During (takeoff and landing) the (propeller) is oriented so that (**upward lift**) comes into play. During (flying) the (propeller) changes direction so that (**lateral force**) comes into play.

Red Blue

Blue Red

Rearranging - Reorienting Non-Uniform



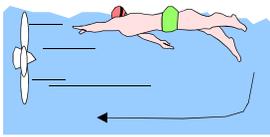
Part of a single (sport shirt) is (red) while another part is (blue). During (playing on one team) the non-uniform (sport shirt) is oriented so that (**red**) is emphasized. During (playing on another team) the (sport shirt) is reoriented so that (**blue**) is emphasized.

Separate Gradually

Test for Separate Gradually

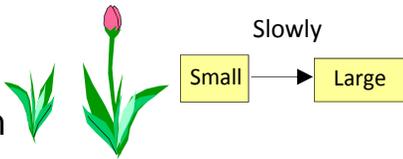
Will a complete resolution of the contradiction allow starting with **(little)** (water) and ending with **(much)** (water) or *its equivalent*? This would be allowable so we will try to separate gradually.

Repeated Use



(Little) (water) is used over and over which is equivalent to **(much)** (water). (Recirculation of the water) is used to make this happen

Maturing / Proliferation



The (shade producer) is capable of self organization through (biological growth). During (the time that the plant is small) the (shade producer) starts as **(small)**. Over time the (shade producer) matures or proliferates to become **(large)** during (the time that the plant needs a lot of shade).

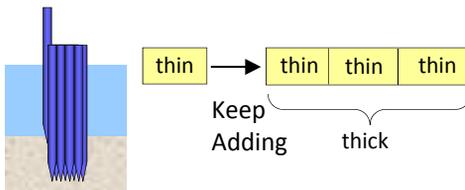
Separate Use



Individual (explosions) which are **(small)** come into play gradually during (excavation). In the end, the sum effect is a **(large)** (explosion).



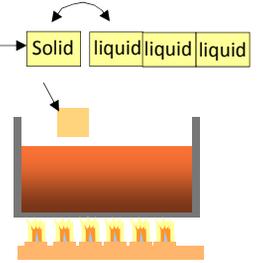
Gradually Merged



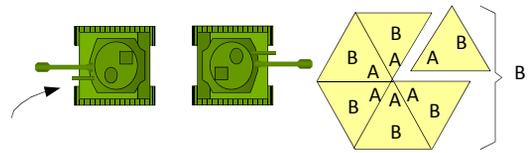
Multiple or segmented (piles) are available. Gradually merging the **(thin)** (piles) during (driving) results in the equivalent of **(thick)** (piles).

Merging—Interaction

Multiple or segmented (metal elements) are available. Each **(solid)** (metal element) that is merged with the already merged (metal elements) become **(liquid)** by (being melted by the previously melted elements).

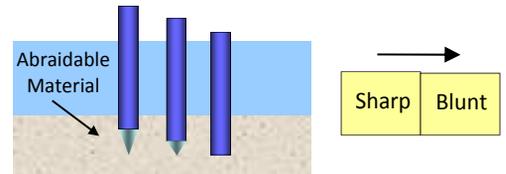


Gradually Hidden / Exposed



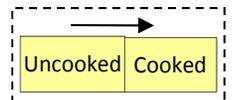
The (tank) already has both properties. (Protected) is desirable and **(vulnerable)** is undesirable. The (tanks) are gradually merged in a way that hides (vulnerable) until the whole is **(protected)**.

Gradually Transformed



The (pile) (tip) is made from (abraidable material). During (driving) the (pile) transforms from **(sharp)** to **(blunt)**.

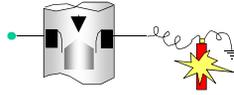
Gradually Added Fields



The (food) (bulk) can be changed from **(uncooked)** to **(cook)** by gradually adding a (thermal) field. During (cooking) the (food) transforms from (uncooked) to (cooked).

Separate in Space

Test for Separation in Space

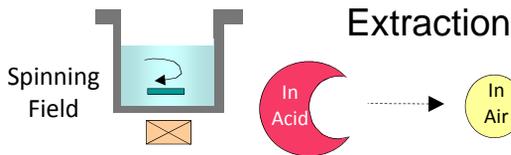


During (the moment that the plug passes a critical point in space) (**intimate contact**) is essential (where the conductor must conduct across the contacts). (**No contact**) is essential (at any location where there is no interaction with the part of the plug that interacts with the contacts). No overlap in space is required

Two Objects



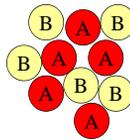
If more than one type of (spray nozzle) is allowed, one (spray nozzle) is (**heavy droplets**) and a nearby (spray nozzle) is (**fine mist**).



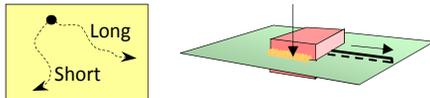
If the (acid stirrer) can be separated into functional parts: The separated (stirring element) is (**in the acid**). The (rest of the stirrer) is (**in air**). The separated parts interact through (a magnetic coupling).

Mixture

(Metallic fibers (A)) which are (ductile) are mixed with (ceramic particles (B)) which are (brittle).

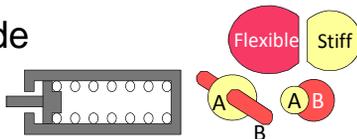


Path



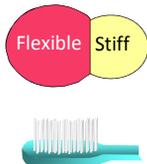
On a path (through the board) the (wire length) is (**short**). On a path (around the board) the (wire length) is (**long**).

Interact / Guide / Nestle / Penetrate



The (spring) is (**flexible**). The interacting (spring housing) is (**stiff**). The objects (interact, guide, nestle or go through each other).

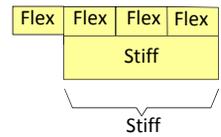
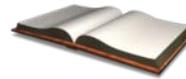
Attached Objects



The (handle) is (**stiff**). The attached (bristles) are (**flexible**).

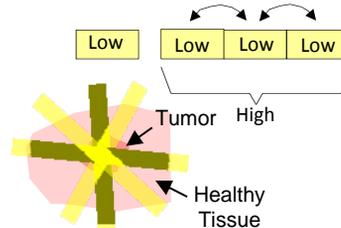
- Inert carriers
- Dual states-same material
- Dual phase substances
- Thin Films
- Paint
- Nested parts
- Attached parts
- Mixed somewhat

Partly Carried



Several (pages) can be used. Some of the (pages) which are (**flexible**) are attached to a (binding) which is (**stiff**). The (binding) and attached (pages) are collectively (**stiff**). The (parts of the pages) which are not carried are still (**flexible**).

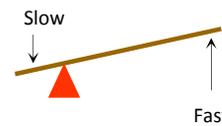
Partly Merged or Interacting



- Merge
- Nestle
- Interlink—may require reshaping
- Linked by Transmission
- Hinged

Several (radiation beams) can be used. They partially merge or interact with each other by (crossing the beams). The partly merged (section of the beams) is (**high intensity**). All that are unmerged are (**low intensity**).

Non-Uniform

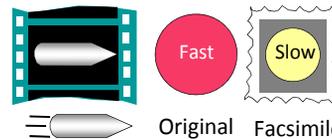


- Transformers (electric, levers, etc.)
- Standing Waves
- Concentrated Additives
- Especially active Additives

Only one (lever) is allowed. One part of the (lever) is (**slow**). Another part of the same (lever) is (**fast**).



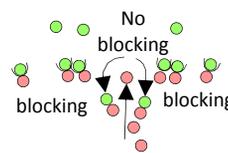
Facsimile



The (bullet) is unfortunately (**fast**). But we can change its (appearance, sound, feel, smell or effect) to seem like it is (**slow**) when using (a movie of the bullet).

- Photographs
- Movies
- Paint Coverings
- Molds
- Time lapse photos
- Impressions
- Silhouettes
- Castings
- Resists
- Projections
- Computer Models

Selective Countering



For actions, forces or extrinsic attributes that depend upon interactions such as beauty. Part of the (offensive line) has (**blocking**) in one location. In another location of the (offensive line) the (**blocking actions do not exist**).

On Condition

One (boat) is (**in the water**) rendering it (**mobile**). Another (boat) is (**on the land**) rendering it (**immobile**).



Separate between the Parts and the Whole

Test for Separation Between the Parts and the Whole

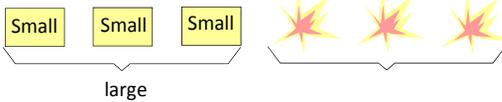


Step 1: At a critical moment in time, should either (failed) or (not failed) be hidden or minimized to solve the problem? Yes, if bulb failure were hidden it would solve the problem.

Step 2: At a critical moment in time, do I want (failed) AND (not failed) to occur at different scales? No, I do not want a "failed" light to occur at any scale.

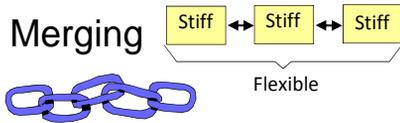
Step 3: If the answer to 1 or 2 is "yes", separate between the parts and the whole. The answer to 1 is "yes".

Formation



(Individual) (explosions) are (**small**). The (explosions) are arranged into a formation which (is sufficiently close to have the required effect). This formation has the macro effect of being (**large**). (Smallness) is (hidden).

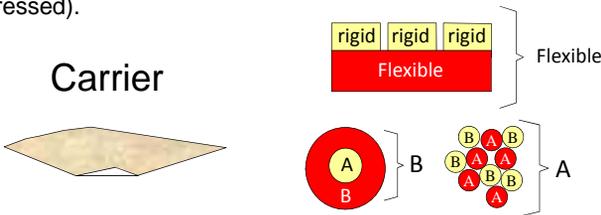
Merging



(Segmented or individual) (anti-slip devices) have the property of being (**stiff**). When made to interact with each other by (interlocking), the overall system is (**flexible**). (Stiffness) is (expressed not expressed).

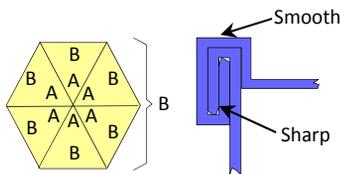
- Interact—Field
- Interact --mediator
- Transmission
- Touch
- Interweave
- Nest
- Nestle
- Interlink
- Clamped
- Hinged
- Interfused
- Fractals

Carrier



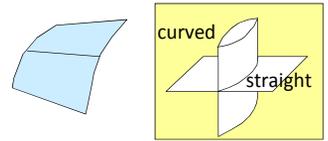
(An inexpensive carrier—Paper) which is (**flexible**) is (attached to, surrounding or mixed with) (segmented or individual) (abrasive particles) which are (**rigid**) thus loaning its property and making the combination (**flexible**) at the macro scale. (**Rigidity**) is (hidden or expressed at the micro scale).

Hiding Part



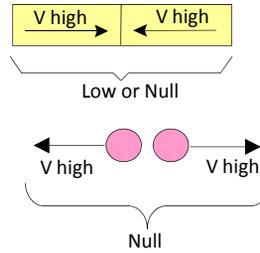
Each individual (piece of the can) already has the undesirable property of (**sharp (A)**) and the desirable property of (**smooth (B)**), even in the slightest degree. The (can parts) are merged (by rolling the edges up in a seam) thus giving the general property of (**smooth (B)**).

New Dimension



The (panel) has the property of being (**curved**). Going (up or down) in dimension gives the (panel) the property of being (**straight**) since (a section through the panel is a straight line which is sufficient in the direction of air flow).

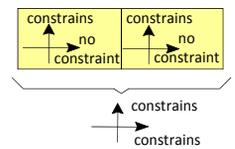
Countering



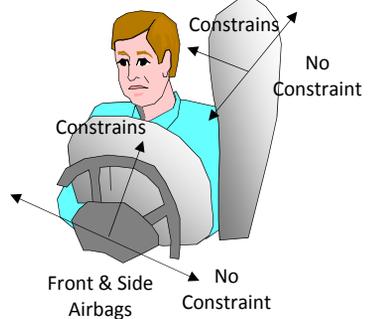
- Opposing Element
- Counter Weight with Transmission means
- Negative Spring Rate
- Negative rate of change of lever arm
- Counter Field Gradient

The (camera element) (motion) has a direction with the undesirable property of (**high velocity**). Countering the (motion) with (a high velocity motion of a counter weight in the opposite direction) gives the desirable (**null velocity of the system**).

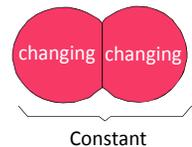
Complimentary Directions



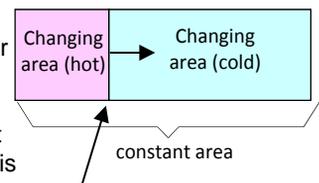
Each (airbag) is (**constraining**) which is desirable in one direction and (**not constraining**) which is undesirable in another direction. Combining two or more (airbags) and orienting them in a complimentary fashion makes the combination (**constraining**) in both directions.



Coordinated Parts



Adjustable (flow areas) have the property of being (**changing**). When coordinated with each other by (a coordinated partition that keeps the overall area constant), the overall effect is (**constant**). (Changing) is (expressed).

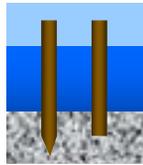


Coordinated Partition.

Separate by Direction

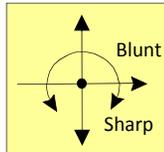
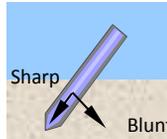
Test for Separation by Direction

Does one of the conflicting properties already exist in a different direction or can it be modified to be so? The pile is already **blunt** in its sides. Try to separate by direction.



Separate by Direction

The (pile) is (**sharp**) (in the direction of driving). The (pile) (is already or can become) (**blunt**) (in the opposite direction or at right angles or in the rotary direction) if (the supporting force is directed in the sideward's direction).



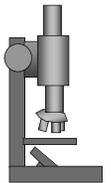
Separate by Perspective

Test for Separation by Perspective

Is it sufficient too only appear to have one of the knob settings? If yes then separate by perspective

How You Look or Perceive

Actually: Small
Looks: Large
(In microscope)



The (bacterium) is naturally and unfortunately (**small**). It (looks like) it is (**large**) when (viewed under a microscope).

Looks Like

Actually: Wood
Looks Like: Marble



The (panel) is unfortunately (**wood**). But we can change its (appearance) to seem like (**marble**) when using (paint).

Inference

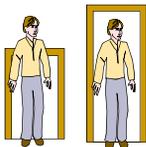
Actually: Black
Inferred to be: White



The (pebble) is unfortunately (black). But we can change the implication to seem like it is (white) by (dropping the black pebble).

Separate by Frame of Reference

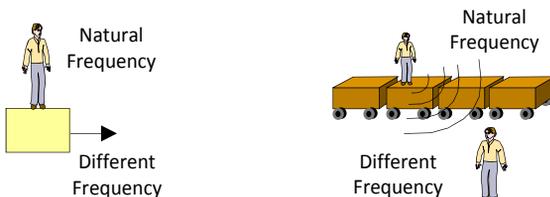
By Comparison



Tall: Compared to short door
Short: Compared to tall door

The (actor) is already (**short**) when compared to (the size of surroundings and other actors). Changing (the surroundings and other actors) by (miniaturizing the set props and putting the actor on a raised platform) makes the (actor) (**tall**).

Inertial or Spatial Frame of Reference



The (vehicle sound) is already (**not the natural frequency**) when compared to (the velocity of the approaching vehicle). Changing the frame of reference by (getting on the vehicle) makes the (vehicle sound) (**the natural frequency**).

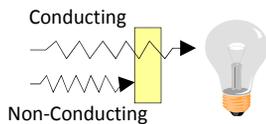
Separate by Response of Fields

Test for Separation by Response of Fields

It is essential that the field response to the (substance in the operating region) must be (**setting A**) for (field region A or field A)

The field response to the (substance in the operating region) must be (**setting B**) for (field region B or field B) Is it essential that field region or field A and B be the same? If they must be the same, then jump to Separation between Substance and Field.

Separate by Response of Fields



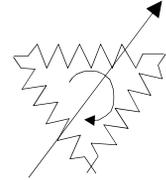
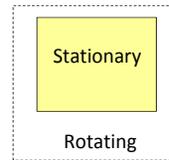
- Optically transparent materials
- Resonant structures
- Field shape changing materials
- Field gradient changing materials
- Reflective or channeling structures
- Filters
- Frequency or color changing
- Speed changing
- Phase changing
- Polarization changing
- Field Type changing
- Field absorption changing materials

The response of (field region A or field A) to (material, coating or structure) is (**setting A**). The response of (field region B or field B) to (material, coating or structure) is (**setting B**).

For Example:

The response of (visible light) to (glass) is (**conducting**). The response of (ultraviolet light) to (glass) is (**non-conducting**).

Separate Between The Substance and the Field



The field element associated with the conflict is (a magnetic field). The substance element associated with the conflict is (the field coils). The (magnetic field) is (**rotating**) and the (coils) are (**stationary**). This is accomplished by (switching on the coils in a predetermined sequence. The magnetic field direction appears to rotate, depending on the sequence of the switching).

Compensate

Turn a knob sufficiently to fix the given problem without regard for what gets worse. Identify another knob which can be turned which compensates for the first one turned.