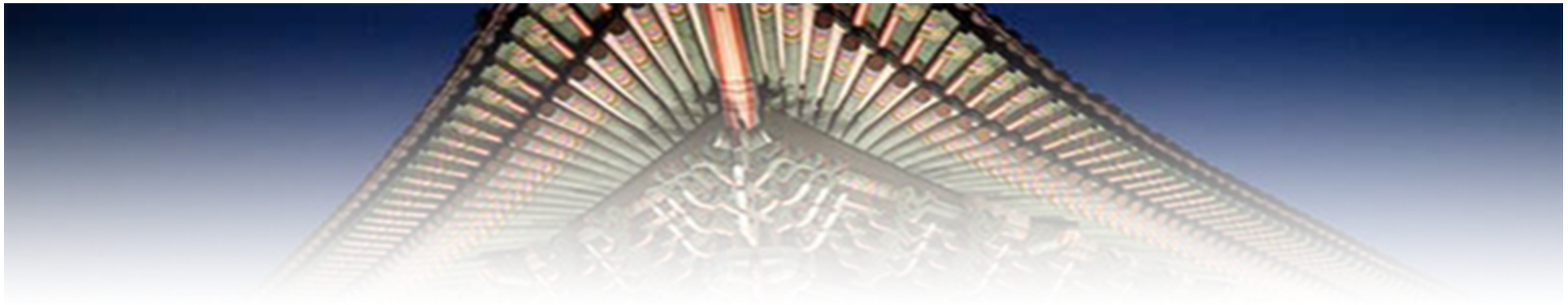

FOS electronic database for training in RTV (Creative Imagination Development)

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abstract

- Presented article suggests a variant of electronic database on generalized (basic) functions. This database could be used in FOS (Function-Oriented Search) approach for description of functioning of various Technological Systems. Authors suggest using FOS approach as a simulator for development of creativity in RTV (Creative Imagination Development) training.
- The database is organized as a matrix comprising 18 cells; each cell contains the hyperlink to appropriate Internet collection of examples on generalized functions. Three columns of 6*3 matrix follow to suggested by authors categorization of three main objects of various operations: substance, field and information. Six rows of matrix reflect the categories of typical generalized operations (basic verbs and their synonyms) that were discovered by authors in their practical activities.
- The database could be utilized for improvement of creativity and inventive thinking skills through development of ability to reveal similar generalized functions in various technological objects. In course of training, a trainee, after reading 20-30 examples in each cell of matrix, should find several her/his own examples. In this way, trainees learn how to practically use FOS approach.
- Suggested training supported by simple software could also serve as a test to measure user's creativity by measurement of two parameters: time consumed by exercise, and level of similarity of user's examples to those from database. The further apart user's examples are from database ones and the faster the user performs the exercise, the more creative the user is.
- The article comprises overview of various tests that measure creativity.

- Keywords: functions of technological systems; RTV (Creative Imagination Development); FOS (Function-Oriented Search); creativity development; tests; creativity measurement.

- Link to active DB: http://www.triz-summit.ru/ru/section.php?docId=5662 or in http://triz-solver.com/index.php/izmerenie-kreativnosti/162-rtv-na-osnove-spravochnika-po-fop or in www.gen3.co.kr

Analogy : Similar situation → Similar solution

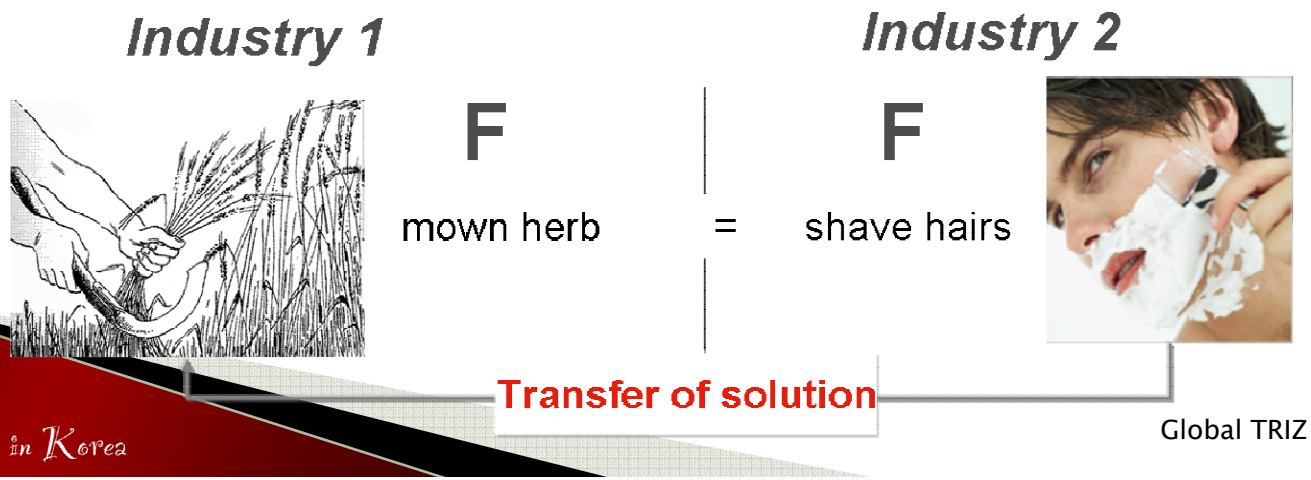
If A ≡ B, B ≡ C → A ≡ C

Criteria of comparing objects:

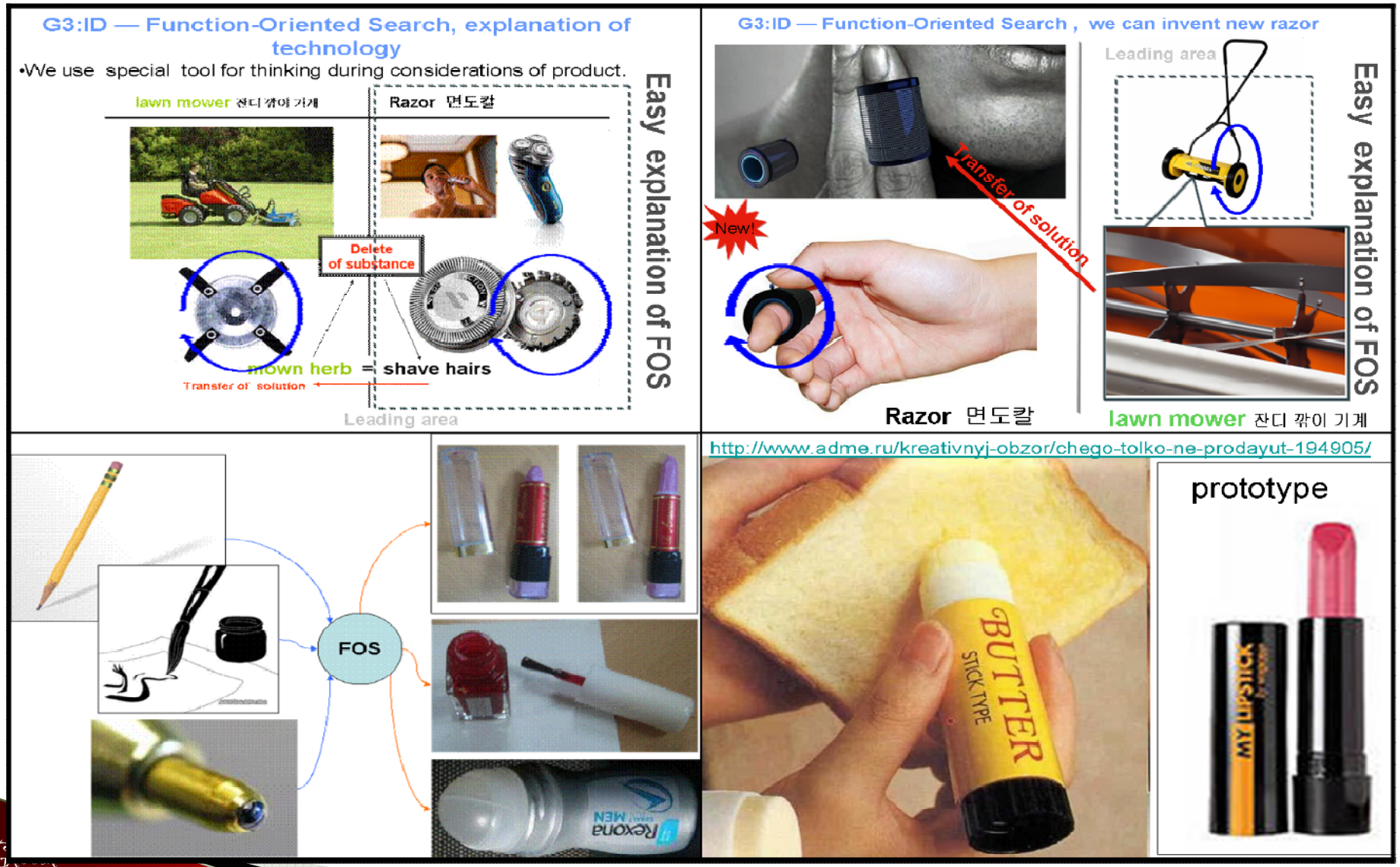
- Similar function → similar solutions
- Similar disadvantages → similar solutions
- Similar Physical Contradiction → similar solutions
- Similar scenarios (TESE, 40) → similar solutions

FOS (Function Oriented Search)

•it is method of analogy for solve problem with function's criteria.



Several examples for FOS and RFOS



Several examples for RFOS

Main Products of Client

- Semi-conductive Tapes (Conductor Shield Tapes)
- Semi-conductive Tapes (Insulation Shield Tapes)
- Non-conductive Tapes

7

5. umbrella with a heatable fabric to dry itself

면발열 천을 우산천으로 이용하여 발열 건조

내구성	접착성	심미성
방정전기	항균성	발열성

Needs

젖은 우산은 펴서 오랜 시간 놔둬야 건조할 수 있으며, 건조하기 전까지 여러 곳에 물을 흘리거나 묻힐 수 있어서 번거롭고, 세균이 번식할 수 있음.

Concept

로이포스 전도성 원단을 우산 천으로 활용하고 전류를 흘릴 수 있도록 회로를 구성하여 발생되는 열로 우산을 쉽게 건조시킴. 검은 색도 무방함. 하지만 위험방지설계가 필요.

15

4. Furnature with anti-electrostatic fabric

전도성 천을 침대나 소파, 이불 등에 사용하여 정전기 방지

내구성	접착성	심미성
방정전기	항균성	발열성

Needs

기존의 침대나 소파, 이불은 정전기가 발생하기 쉬워서 불쾌감을 유발하고 건강에도 안 좋을 수 있음.

Concept

이불을 전도성 천으로 하면 정전기를 방지하여 늘 쾌적한 상태에서 접촉할 수 있음. 이러한 응도로 PE 지제의 내구성과 항균성 등이 잘 맞을 수 있음. 미관상 문제가 있다면 커버등 추가 가능

14

4. water leasure tools with heatable fabric for drying

면발열 천을 물놀이 튜브, 보트 등에 이용하여 발열 건조

내구성	접착성	심미성
방정전기	항균성	발열성

Needs

물놀이 튜브나 보트도 젖은 우산과 마찬가지로 건조하기 불편하다는 단점이 있음

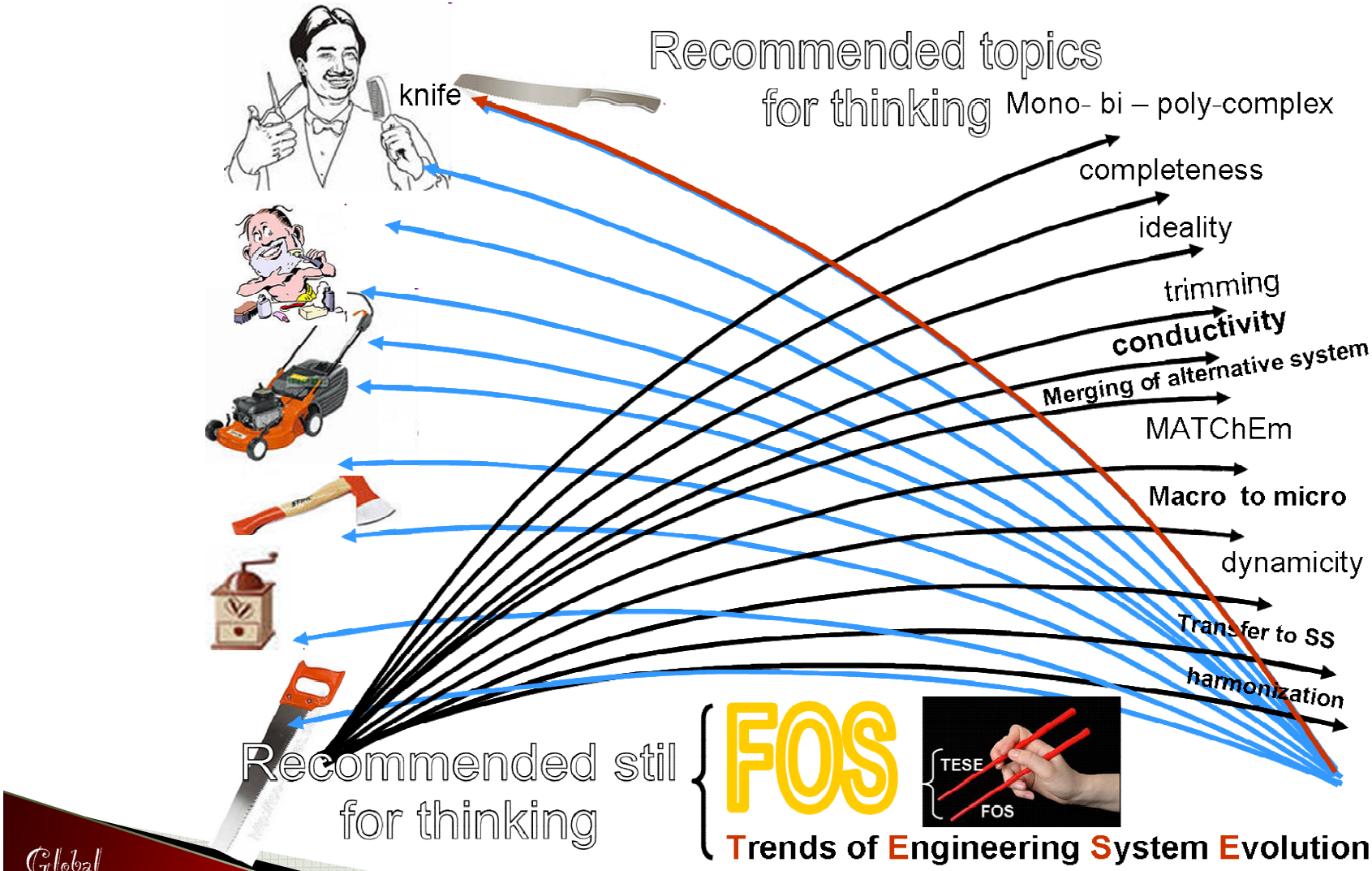
Concept

로이포스 전도성 원단을 튜브나 보트의 천으로 활용하고 전류를 흘릴 수 있도록 회로를 구성하여 발생되는 열로 천을 쉽게 건조시킴.

16

Yury Danilovsky "Example about benchmarking analysis for Technical System "Knife""
http://triz-solver.com/index.php/zakonomernosti-razvitiya-tekhniki/184-benchmarking-fo-knife

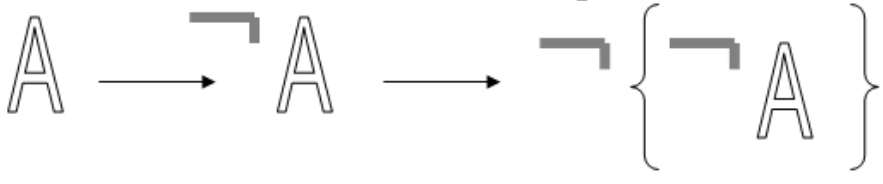
Real practice of FOS



3 laws of dialectic by Hegel 게오르크 빌헬름 프리드리히 헤겔
http://ko.wikipedia.org/wiki/게오르크_빌헬름_프리드리히_헤겔

Logic of classification system

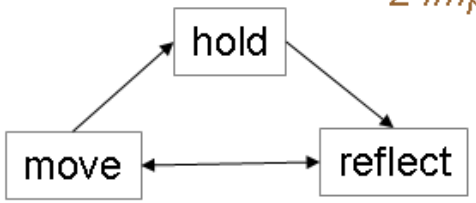
1 law - contradiction
2 law - transformation of quantity into quality
3 law- twin negation

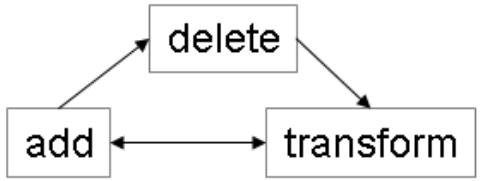


¬ Mind "not" – "negation"- object with opposite features

mono	move → (not move) = hold	
	Hold → not (not hold) = change direction of movement = reflect	complex
Bi-poly	add → (Not add) = delete	
	Not add → Not (not add= delete) = not delete= transform	complex

2 important triads





http://en.wikipedia.org/wiki/Georg_Wilhelm_Friedrich_Hegel

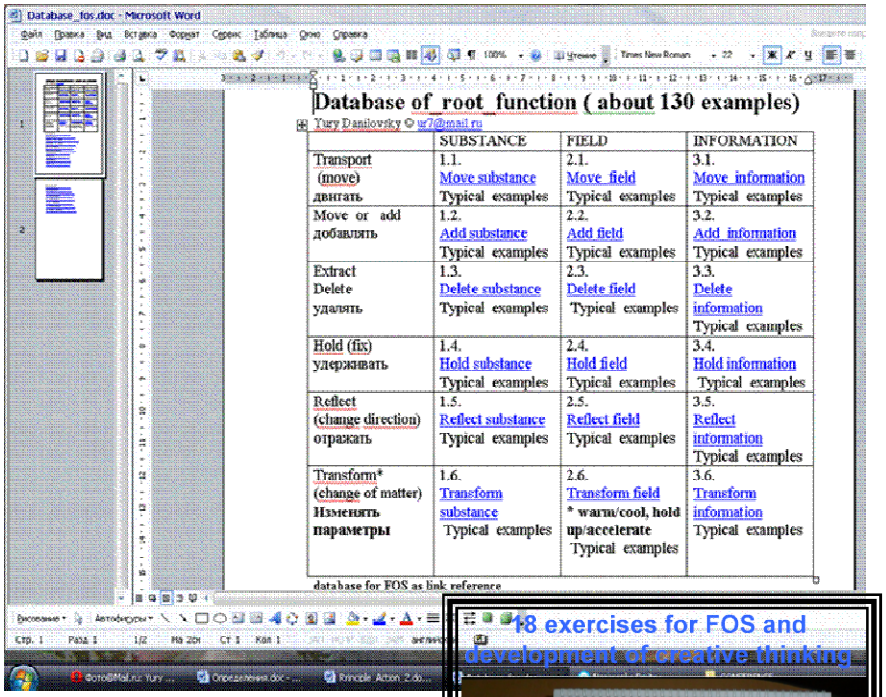
Practical classification system

TYPICAL VERBS FOR FUNCTION	SUBSTANCE	FIELD	INFORMATION
Move, pull, push, revolve, propel, tir, jump, shove, jostle, poke, jab, insert, put, bump, hustle 이동시키다, 운직이다. 당기다/밀다, 회전시키다, 추진하다, 쏘다, 던지다, 밀치다, 찌르다, 지고 빠시나, 넣나, 놓나, 부닞지나, 흔들나.	1.1. Move substance Typical examples	2.1. Move field Typical examples	3.1. Move information Typical examples
Add, pour, infuse, inject, blast, append, supplement, throw in, tag, top up, tack, eke, stick, weld, sew 접착제, 용접, 디하다, 덧붙이다. 추가하다; 붓다, 우리다, 집이넣다, 매달다, 던져넣다, 꼬리표를 붙이다, 채우다, (압정을) 박다, 연장해붙이다, 접착해붙이다, 용접하다, 바느질해붙이다.	1.2. Add substance Typical examples	2.2. Acd field Typical examples	3.2. Adc information Typical examples
Extract , dig, delete, cut, remove, eliminate, purge, expel, exclude, filter, move away, prune, amputate, elicit, retrieve, recover, derive, draw, unearth 제거하다. 없애다; 수출하다, 파내다, 지우다, 삭제하다. 정소하다, 수방하다, 제외시키다, 길러내다, 지워버리다, 가지치다, 잘라내다.	1.3. Delete substance Typical examples	2.3. Delete field Typical examples	3.3. Delete information Typical examples
Hold , fix,, retain, maintain, withhold, hold down, deter, deduct, restrain, detain, stop, confine 고정하다, 지지하다. 잡다, 포함(내포,보관)하다. 주지않다. 가두다, 정지시키다. 국한시키다.	1.4. Hold substance Typical examples	2.4. Hcld field Typical examples	3.4. Hold information Typical examples
Deflect, reflect, change direction of movement, protect, mirror, agitation of some substances or fields, focus, repel, repulse, beat back, parry, 굴절시키다, 운동방향을 바꾸게 하다; 반사시키다, 난류를 만들다, 밀어내다, 집중시키다, 방사시키다, 막아(뒤겨)내다.	1.5. deflect substance Typical examples	2.5. deflect field Typical examples	3.5. deflect information Typical examples
Transform* (change of matter), convert, shatter, disintegrate, crush down, heat, warm, hot, calorify, cold, froze, 바꾸다. (성질을) 변화(변환)시키다, 변형시키다. 부수다, 눌러부수다, 가열하다, 냉각시키나, 얼리나. 삽아늘리나, 녹이나, 증발/승화시키나, 압축/응축시키나, 산화시키나, 자화시키나 등	1.6. Transform substance Typical examples	2.6. Transform field Typical examples	3.6. Transform information Typical examples

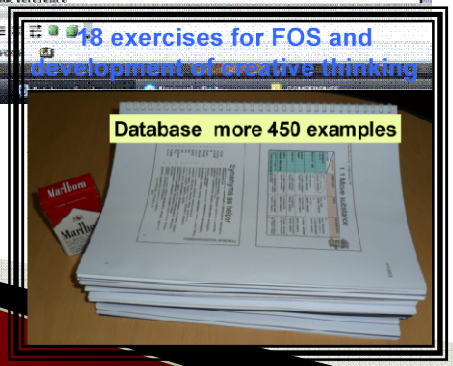
New platform to develop creative thinking

Step 1.18 exercises to develop skills

Step 2. prastice in real cases



	SUBSTANCE	FIELD	INFORMATION
Transport (move) двигать	1.1. Move substance Typical examples	2.1. Move field Typical examples	3.1. Move information Typical examples
Move or add добавлять	1.2. Add substance Typical examples	2.2. Add field Typical examples	3.2. Add information Typical examples
Extract Delete удалять	1.3. Delete substance Typical examples	2.3. Delete field Typical examples	3.3. Delete information Typical examples
Hold (fix) удерживать	1.4. Hold substance Typical examples	2.4. Hold field Typical examples	3.4. Hold information Typical examples
Reflect (change direction) отражать	1.5. Reflect substance Typical examples	2.5. Reflect field Typical examples	3.5. Reflect information Typical examples
Transform* (change of matter) Изменять параметры	1.6. Transform substance Typical examples	2.6. Transform field * warm/cool, hold up/accelerate Typical examples	3.6. Transform information Typical examples



Education without trainers

Global TRIZ Conference 2013 in Korea

- Move, pull, push, revolve, propel, tir, jump, shove, jostle, poke, jab, insert, put, bump, hustle
- Двигать, перемещать, толкать, вращать, трясти, вставлять, ударять, шевелить, трясти, нажимать, размешивать, тянуть, стукнуть, ставить, помещать, бросать, излучать
- 이동시키다, 움직이다. 당기다/밀다, 회전시키다, 추진하다, 쏘다, 던지다, 밀치다, 찌르다, 치고 빠지다, 넣다, 놓다, 부딪치다, 흔들다.
- เคลื่อนย้ายดึงผลักหมุนไปรอบๆขับเคลื่อนกระโดดชุกกระแทกโผล่แทงแทรกใส่ชนเร่งรีบ

1. MOVE

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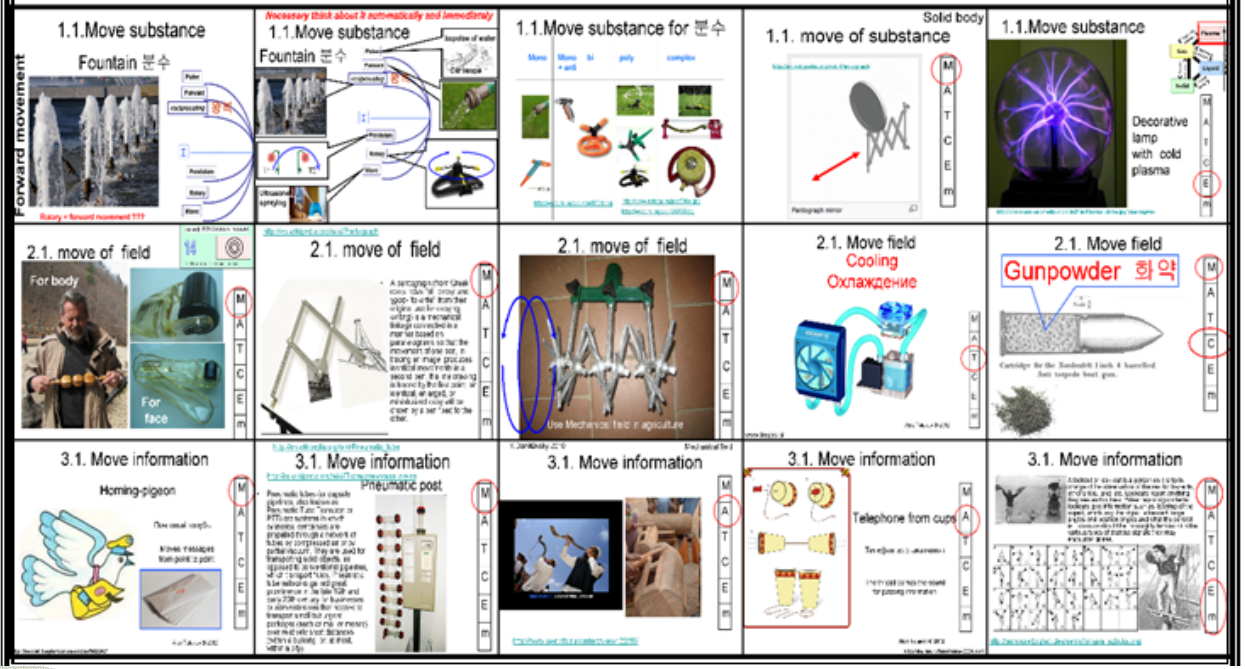

- Add, pour, infuse, inject, blast, append, supplement, throw in, tag, top up, tack, eke, stick, weld, sew
- Добавлять, присоединять, прикреплять, доливать, досыпать, наполнять, приметать, пришивать, приклеивать, приваривать,
- 더하다, 덧붙이다. 추가하다; 붓다, 우리다, 집어넣다, 매달다, 던져넣다, 꼬리표를 붙이다, 채우다, (압정을) 박다, 연장해붙이다, 접착해붙이다, 용접하다, 바느질해붙이다.
- เติ ม เท ใส่ ชี ด ระบิ ด ผนวก เสริ ม โยน แท็ ก วางไว้ ต้ านบน กลั ด ติ ด เชื่ อม เย็ บ

2. ADD

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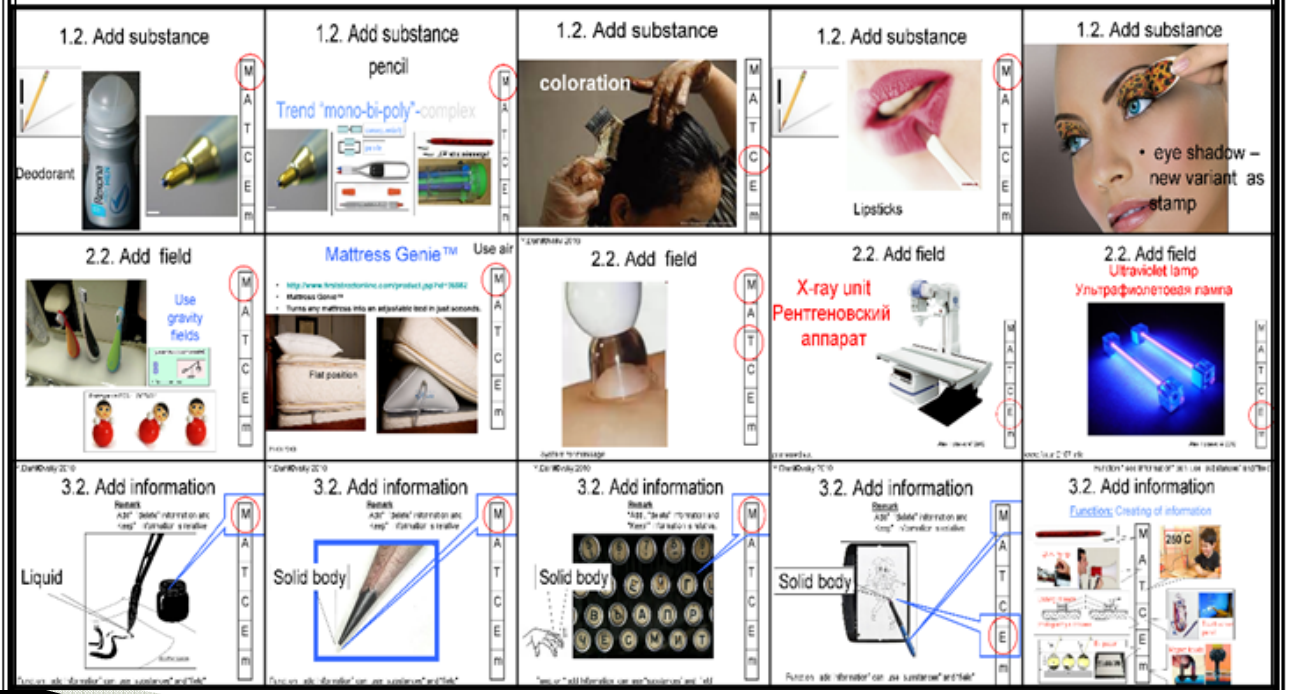

- Extract , dig, delete, cut, remove, eliminate, purge, expel, exclude, filter, move away, prune, amputate, elicit, retrieve, recover, derive, draw, unearth
- Удалять, стирать, фильтровать, очищать, исключать, вычёркивать, извлекать, добывать, выкапывать, экстрагировать, выпаривать, выталкивать, обрезать,
- 제거하다. 없애다; 추출하다, 파내다, 지우다, 삭제하다. 청소하다, 추방하다, 제외시키다, 걸러내다, 치워버리다, 가지치다, 잘라내다.
- สารสกั ด ขุ ด ลบ ตั ด ลบ กำ จั ด ล้ า ง ขั บไล่ ยกเว้ น ตั วกรอง ย้ ายออกไป ตั ด ล้ วง เรี ยก กู้ คื น มา วาด พบ

3. REMOVE

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- Hold, fix, retain, maintain, withhold, hold down, deter, deduct, restrain, detain, stop, confine
- Удерживать, держать, хранить, сохранять, задерживать, фиксировать, останавливать
- 고정하다, 지지하다. 잡다, 포함(내포,보관)하다. 주지않다. 가두다, 정지시키다. 국한시키다.
- ถือแก้ไขเก็บรักษาระงับค้างไว้ยับยั้งหักกักหยุดชิดขัน

4. HOLD

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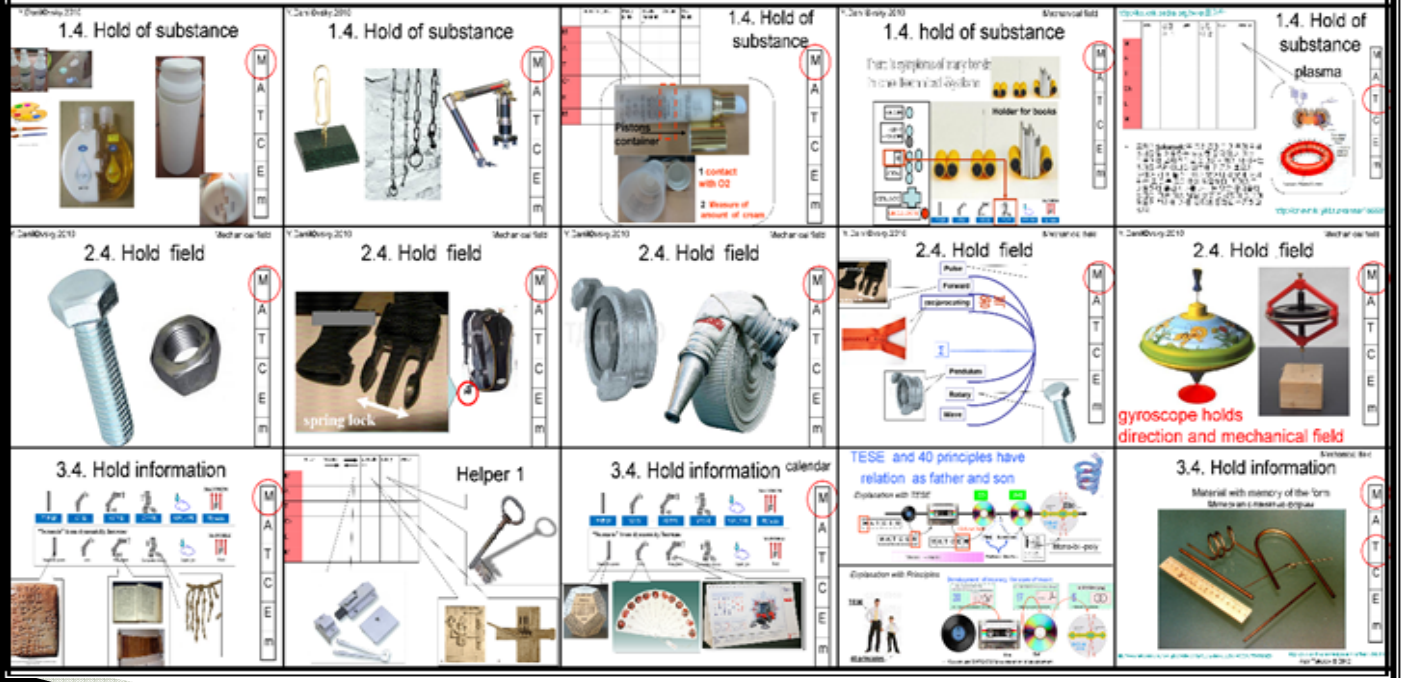

- Deflect, Reflect, change direction of movement, mirror, agitation of some substances or fields, focus, repel, repulse, beat back, parry,
- Изменять направление движения, отражать, предохранять от удара, создать турбулентность, реверберировать, воздействовать, отклонять, отталкивать, отбрасывать, препятствовать, преграждать
- 굴절시키다, 운동방향을 바꾸게 하다; 반사시키다, 난류를 만들다, 밀어내다, 집중시키다, 방사시키다, 막아(튀겨)내다.
- หันเหความสนใจสะท้อนให้เห็นถึงเปลี่ยนทิศทางของการเคลื่อนไหวกระจก
- การก่อกวนของสารบางอย่างหรือหลายเขตข้อมูลมุ่งเน้นขับไล่ตีกลับปัดป้อง

5. DEFLECT

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www.gen3.co.kr/

- Transform* (change of matter), convert, shatter, disintegrate, crush down, heat, warm, hot, calorific, cold, froze,
- **Превращать - Изменять параметры агрегатных состояний вещества по классификации Б.Злотина МАТХЕМ**
- Растягивать, деформировать, смять, разрушать, раздробить, молоть, разбивать, растереть в порошок, превратить в пудру, нагревать, плавить, охлаждать, таять, возгонять, конденсировать, окислить, восстановить, растворить, наэлектризовать, заземлить, намагнитить, размагнитить, фокусировать
- 바꾸다. (성질을) 변화(변환)시키다, 변형시키다. 부수다, 눌러부수다, 가열하다, 냉각시키다, 얼리다. 잡아늘리다, 녹이다, 증발/승화시키다, 압축/응축시키다, 산화시키다, 자화시키다 등
- เปลี่ ยน แปลง ป่ นปี้ สลาย บดขยี้ ลง ความร้ อน อบอุ่ น ร้ อน ความร้ อน เย็ น แช่ แข็ ง

6. TRANSFORM

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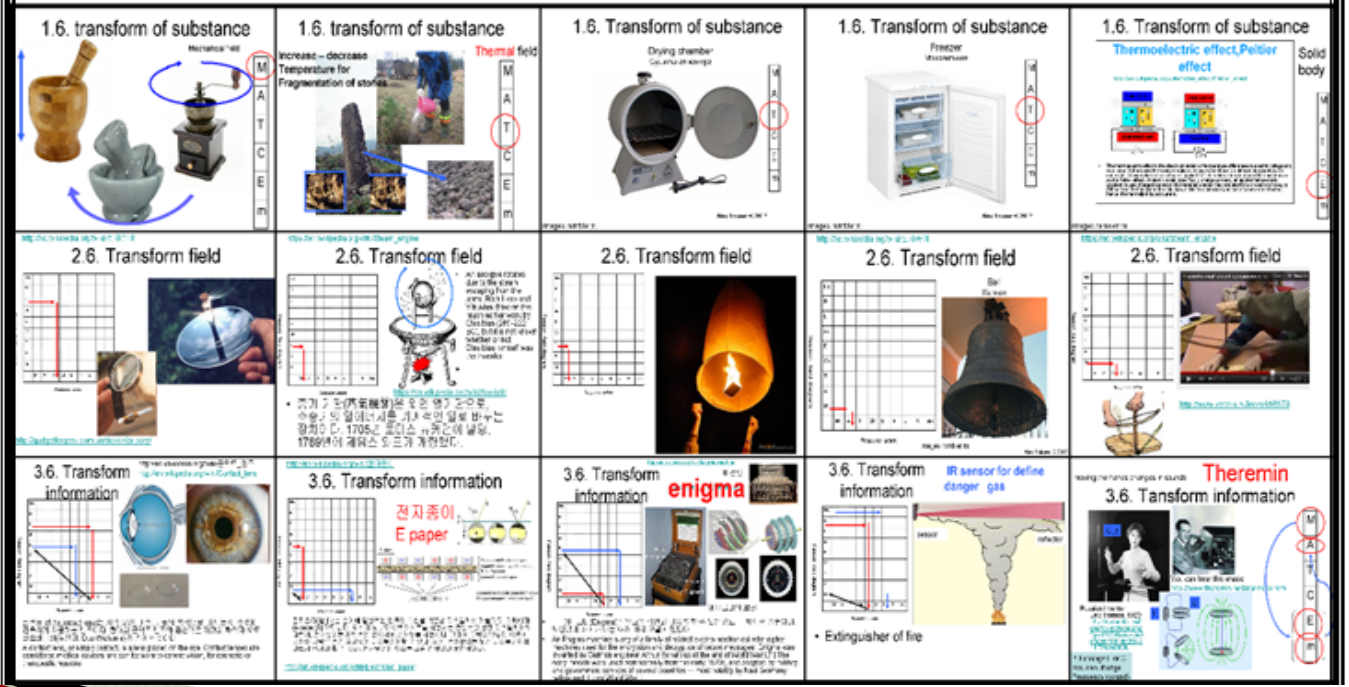
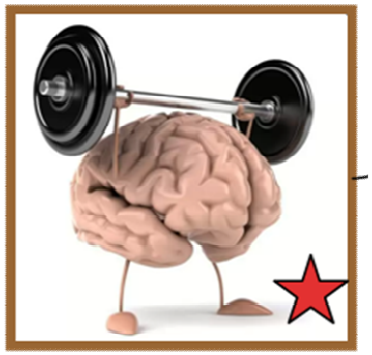
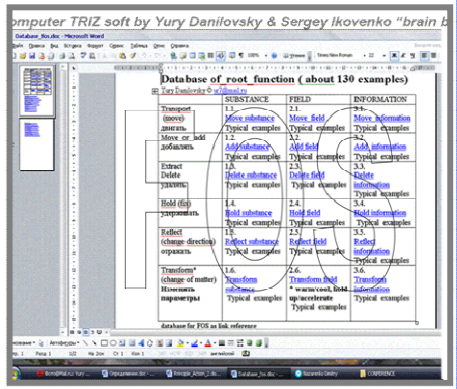
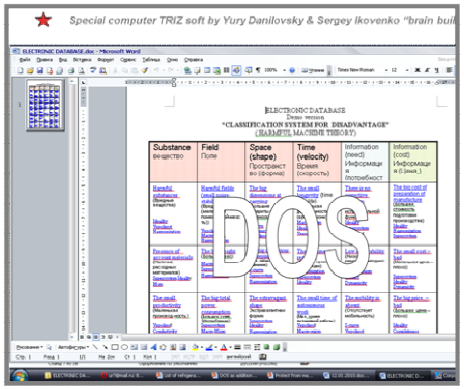


conclusion



"brain building"





Special software with 100 exercises for Recognition in examples Similar :

1. Functions
2. Disadvantages
3. Physical contradictions
4. Scenarios (trends, 40 princ.)

Method of analogy in TRIZ

If A=B, B=C → A=C

Criteria for compare of objects:

1. Similar function – similar solutions
2. Similar disadvantages – similar solutions
3. Similar Physical Contradiction – similar solutions
4. Similar scenarios (TESE, 40) – similar solutions

- Suggested training supported by simple software could also serve as a test to measure user's creativity by measuring of two parameters: time consumed by exercise, and level of similarity of user's examples to those from database. The further apart user's examples are from database ones and the faster the user performs the exercise, the more creative the user is.
- The article comprises overview of various tests that measure creativity.

- Computer program for complex diagnostic of level of creative thinking and increasing IQ "brainbuilding"
- http://triz-solver.com/index.php/izmerenie-kreativnosti/185-computer-program-for-complex-diagnostic-of-level-of-creative-thinking-and-increasing-iq-brainbuilding

New platform: exercises without trainers

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