How Gecko Teaches Us to Segment All Things. Learning Yet More from Nature

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Velcro tape has got a counterpart on the micro-level: "Gecko tape".

The Centre for Mesoscience and Nanotechnology in the University of Manchester has developed a new adhesive, a tape coated with 500-nanometer fibers that are 2 micrometers long. The glueless tape mimics the toe of the gecko. You can find already many articles on the "Gecko tape" in the Net, for example Liz Kalaugher's story in nanotechweb.org [3].

Zoologist, broadcaster and author on wildlife David Attenborough described the gecko as follows: "These small tropical lizards can run up walls, scuttle upside down over ceilings, even cling to vertical panes of glass... scales are responsible. Those on the underside on the toes carry pads formed from enormous numbers of microscopic hairs, invisible to the naked eye... When pressed hard it engages on the tiniest roughnesses, even those that occur on the surface of glass." [1, p. 164]

As we know from a well-known story, the developer of Velcro tape, Swiss engineer George de Mestral, also mimicked nature. After a hike he saw that his pants were covered with cockleburs. He examined the burr's hooks under a microscope and got the idea to use tiny hooks and loops as fabric fastener. Velcro was invented.

Velcro and gecko tapes display the transition to micro-level or segmentation, see "Simplified TRIZ", p. 114 and 133 [4]. Biomimetics or biomimicry fits well to patterns and principles studied in TRIZ!

Perhaps there are things in nature that are even tinier? Gecko tape was invented more than fifty years after Velcro. Knowing that the transition to micro-level is inevitable, we can forecast that there will be a following step, for example some kind of nano-tape. Individual nano-hooks were created from carbon ten years ago, but no one can yet produce whole nano-tapes. Perhaps somebody will find "nano-tape" in nature and solve the problem. About ongoing "nano-velcro" research, see Philip Ball's paper in Nature News Service [2].

Table 1 displays the transition from 2 "Velcro" to "Gecko" in nature

A solution in the nature	Magnitude
Velcro	Hooks and loops visible to the naked eye
Gecko	Invisible fibers
Nano in nature?	Nano level

Table 1. Transitions to micro level or segmentation in nature.

Old Solutions Help to Foresee New Ones

Writing on tapes I remembered other solutions I have described earlier in the TRIZ Journal. A series of 24 micro-stories gave new entertaining effects. They remind of the "series" of small florets in daisies and dandelions, see the papers "Micro-Stories, Daisies and Dandelions..." and "Improve it by breaking it..." [6, 7].

Let's now implement the knowledge of ready solutions in the nature, technology and business to foresee new innovations.

In papers on the coffee room application of video technology[5] and on the deaf people as video communication pioneers [8] I have covered the evolution of visual messages

What the transition to micro-level could mean in video communication? We imagine movies, TV programs and videoconferences usually as stories or sessions taking half an hour or more.
If they are "hooks" or "flowers", what are, then, "fibers" and "florets"? Perhaps there will be more mini and micro messages.

Really, "mini movies" or trailers of five minutes are already quite common. Video clips of length of 10-15 seconds, that can be created with new mobile phones, can be considered as "micro movies". They may be humorous stories with images.

State Technical Research Centre VTT of Finland researched last year the use of mobile video. Both hearing-impaired and hearing people tested mobile video application installed in the multimedia phones. Deaf people were "lead users" and liked to use personal video clips.

Transitions give new properties. They are properties that we actually need. Gecko tape gives stronger fixing, micro stories are more saleable and readable, florets are more attractive, short videos give a new form of information and entertainment. He we see the principle 2: Separation, see "Simplified TRIZ", p. 136 [4].

I am sure that small vide clips will flourish, since they are evolving according to the evolution patterns.

Table 2 displays transition to micro level and properties obtained. I recommend that you add these to your examples.

Transition to micro level of Segmentation (Principle 1)	Separation (Principle 2)
Velcro tape → Gecko tape	More strong fixing without glue
Story → Micro story	More saleable and readable
Flower → Florets	More attractive plant
Video → Video clip	More information and entertainment
Your system? → Your micro system?	

Table 2. Examples of solutions by segmentation and benefits from them.

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