

Some aspects on cyber war faring in information arena and cognitive domain

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Outline

- Introduction
- The principles of Cyber warfare
- Cyber warfare and its relation to the information arena, the physical arena and the cognitive domain
- Effects of cyber attacks -Effect matrix
- Case study - Communication jamming
- Conclusions
- Questions

Objective

Purpose: to describe theories and methods for modern war faring within the information arena and cognitive domain

Principles of cyber warfare (1)

Assumptions:

- a) The information arena is the battleground for the digital war
- b) Asymmetry is a characteristic
- c) A cyber attack must give an effect in the real world, directly or indirectly
- d) A successful attack will influence cognitive, perceptive and emotional processes
- e) An objective is to achieve DBA
- f) A successful operation is founded on combinatorical methodology using different capabilities such as EW and CNO

Principles of cyber warfare (2)

Assumptions:

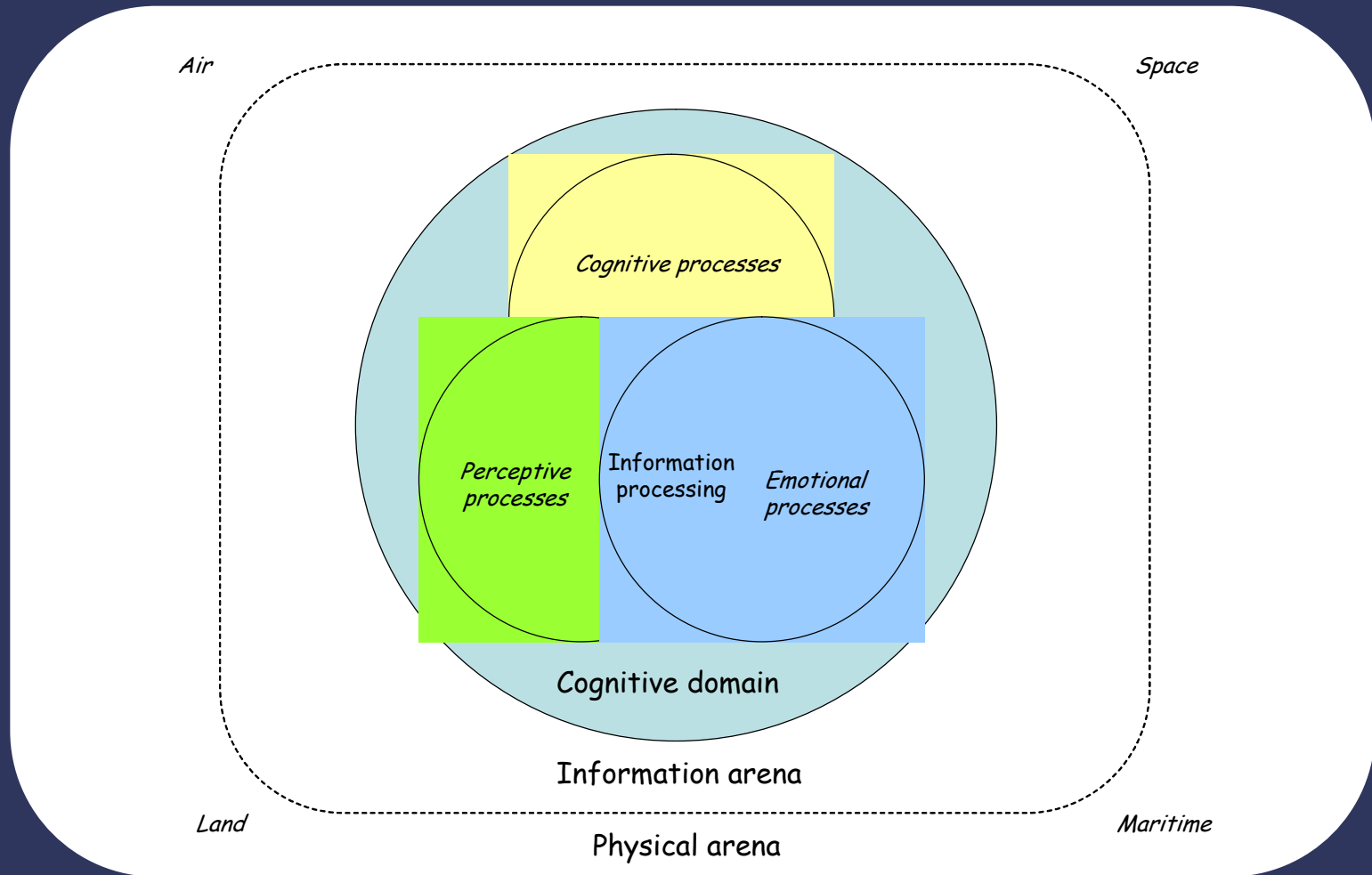
- g) No clear and distinct rules for behaviors in digital world
- h) It is hard to distinguish between deliberate and unintentional effects in cyberspace
- i) Tools for information warfare could be used both for attacks and protection
- j) The attacking and protecting parties control only a small area of cyberspace
- k) The distance to the target is irrelevant
- l) An adversary could act anonymously
- m) An influence on the information arena could have judicial implications, as responsibility may be hard to prove

Cyber warfare and its relation to the arena and domain

Definition: *"... arena is the (virtual and physical) space in which information is received, processed and conveyed. It consists of the information itself and Information Systems"*

(MNIOE White paper)

Arenas and domains



Effects of cyber attacks

Physical effects: physical destruction of information structures with the consequences that the information system could not be used properly (DOS), to knock out electronics; with EW weapons such as EMP

Syntax effects: to attack system logic by delaying information and to develop unpredictable behaviors (viruses, trojans, hacking) using CNO tools

Semantic effects: to destroy the trust in a system by manipulation, change of information and deception that affect the decision making process

Effect-matrix

Means for information warfare/cyber war (EW, CNO, PsyOps, InfoSec)

	Physical arena (land, air, maritime, space)	Information-arena	Cognitive domain (cognition, perception, emotion)
Physical effects	Interruption, destroy electronics and sensors, affect transmission and access links, derive robots, system failure	Interrupted communication, denial of services; DOS	Fragmented communication, decreased amount of information, reduced analysis capability
Syntax effects	Hacking, cracking virus, trojans, spam, interception, exploit, bugging illegal misuse of information system	Attack logic of system, delay and distortion of information	Mistrust against system
Semantic effects	Mass medial maneuvers, planted information, mutilation of sensor data	Deception and manipulation of information (disinformation)	Changed situation awareness, mistrust against and questioned of information, inability for decision making

Case study - Communication jamming

Background: SAF are engaged in an UN-led operation with a recon unit. The purpose is peace protection. Rebels are controlling rural areas. And they are equipped with different weapons including com. jammers.

The Swedish recon force uses UAVs for surveillance. The UAVs are connected by radio links to a ground station that is responsible for remote UAV controlling as well as for processing data to produce information such as pictures, video clips and text. The information will be forwarded to the battalion and brigade staff where analyst works.

The rebels would like either to jam the radio communication in order to hinder data transmission or to shot down the UAVs

Case study -matrix

Communication jamming

Physical arena
(land, air)

Information-arena

Cognitive domain
(cognition, perception, emotion)

Physical effects

Jamming radio communication links, destroy UAVs, achieve system failure

Interrupted communication, denial of services; DOS

Fragmented communication, decreased amount of data and information, reduced analysis capability

Syntax effects

Delay and distortion of information

Mistrust against and questioned of information

Semantic effects

Affect analysts/operators ability for decision making, decreased situation awareness

Conclusions

- Key for success in cyber space is to understand prerequisites for conducting operations in the info arena and cognitive domain
- Need for new theories, methods and definitions that describes the digital battlefield
- Effect matrix could be an applicable method to study effects of cyber warfare
- It could be used as a tool to mix different capabilities and to exemplify effects in future case studies, scenarios etc.

Questions?