Lecture 7 Search Contexts and Search Tasks

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选课同学的认知风格

- **Field Dependent: 10**
- **Field Independent: 15**

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本节课的主要内容

- 关于课时安排及作业
  About the schedule and homework
- The concept of context
- The concept of search task
- Two perspectives of search tasks
  - 将搜索任务视为研究工具 (task as vehicle)
  - 将搜索任务类型作为研究对象 (task as object)

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Schedule

Lecture 1 2020/2/18 IIR: History and background

＊＊＊＊＊＊Part 1：The design of search interface＊＊＊＊＊＊

Lecture 2 2020/2/25 Design of Search Homepage Interface

Lecture 3 2020/3/3 Design of search result pages

＊Part 2：Information search models and search behavior analysis＊＊

Lecture 4 2020/3/10 IIR theories and models

Submission deadline for assignment 1：2020/3/16

Lecture 5 2020/3/17 Search strategy analysis

Lecture 6 2020/3/24 Individual characteristics

Lecture 7 2020/3/31 Context/Search Tasks

Title and abstract of term project, submission deadline：2020/4/5

＊＊＊＊＊Part 3：The evaluation of search system＊＊＊＊＊

Lecture 8 2020/4/7 Relevance and measures for evaluation

Lecture 9 2020/4/14 Methods for IIR evaluation

Lecture 10 2020/4/21 Design of User experiment

Submission Deadline for Assignment 2：2020/4/20.

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Schedule

*** * * Part 4: Personalization and Contextualization of Search system * * ***

Lecture 11	**2020/4/28**	**Relevance Feedback**
Lecture 12	**2020/5/12**	**Personalization of Search System**
Lecture 13	**2020/5/19**	**Search log analysis**
Lecture 14	**2020/5/26**	**Mobile Search and Future Search**
Lecture 15	**2020/6/2**	**Presentation of Term Project**
Lecture 15	**2020/6/9**	**Course Summarization**

Assignment 1

所选择的SERP是有趣的、复杂的 Selection of a SERP that is interesting and complex enough	25分
对SERP的解剖式分析是全面的 Thoroughness of your SERP anatomy	25分
对SERP上搜索摘要（surrogates）的正确理解 Understanding of the concept of surrogates	25分
可以将搜索结果设计原则运用到实际分析中 Insightful discussion of design principles	25分
附加分：对SERP上的元素的作用和相互联系的准确分析 Identification of value and relationship of elements in a SERP	
总计	

Presentation of assignment 1

“无处不在的搜索系统”

用视频的方式对你的第一次作业做总体的介绍

1. 简介网站、网址（你为什么选择这个搜索系统，这个搜索系统有什么特别之处）
2. 举例搜索，展示搜索结果中每个surrogate都包含哪些元素，这些surrogates都是如何排序的
3. 总结优点和不足，并对不足之处提出改进的建议

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Abstract for Term Project

- 组名(Group Name)
- 组长及组员信息(Group Members)
- 小组选题(Main topic)
- 摘要(Abstract)：用一段文字具体的解释一下你们感兴趣的选题。
- 问题(Questions if any)：如果你们有疑问，也可以在wiki中列出，老师和助教会在下周查看，帮大家解决疑问。
- 截止日期（deadline）：2020.4.5 晚上8点前

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Context

Context 情境

- Linguistic context, context of use:
  - Discourse that surrounds a language and helps to determine its interpretation
- Circumstance, setting:
  - The set of facts or circumstances that surround a situation or event; *"the historic context"*

Context

- *"There is no term more often used, less often defined and, when defined, defined so variously, as context. "*
- *"Context has the potential to be virtually anything that is not defined as the phenomenon of interest."*

Dervin, 1997

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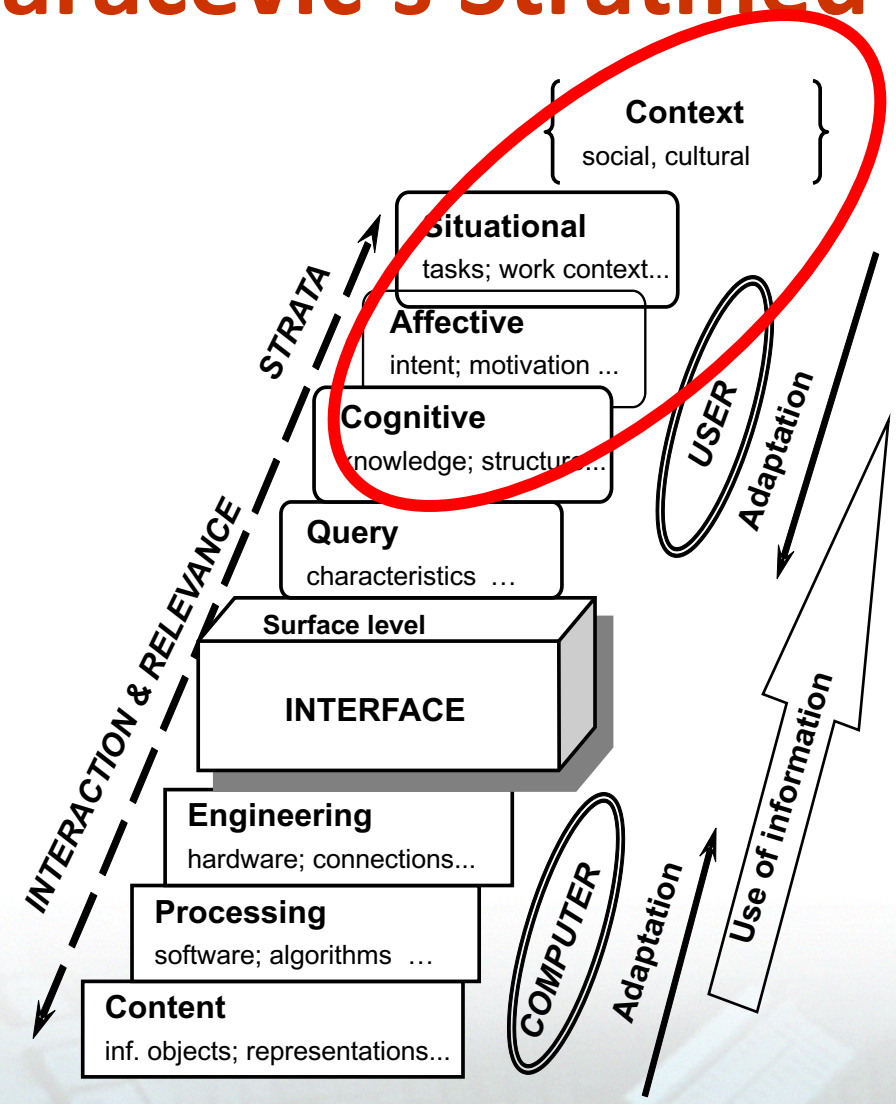
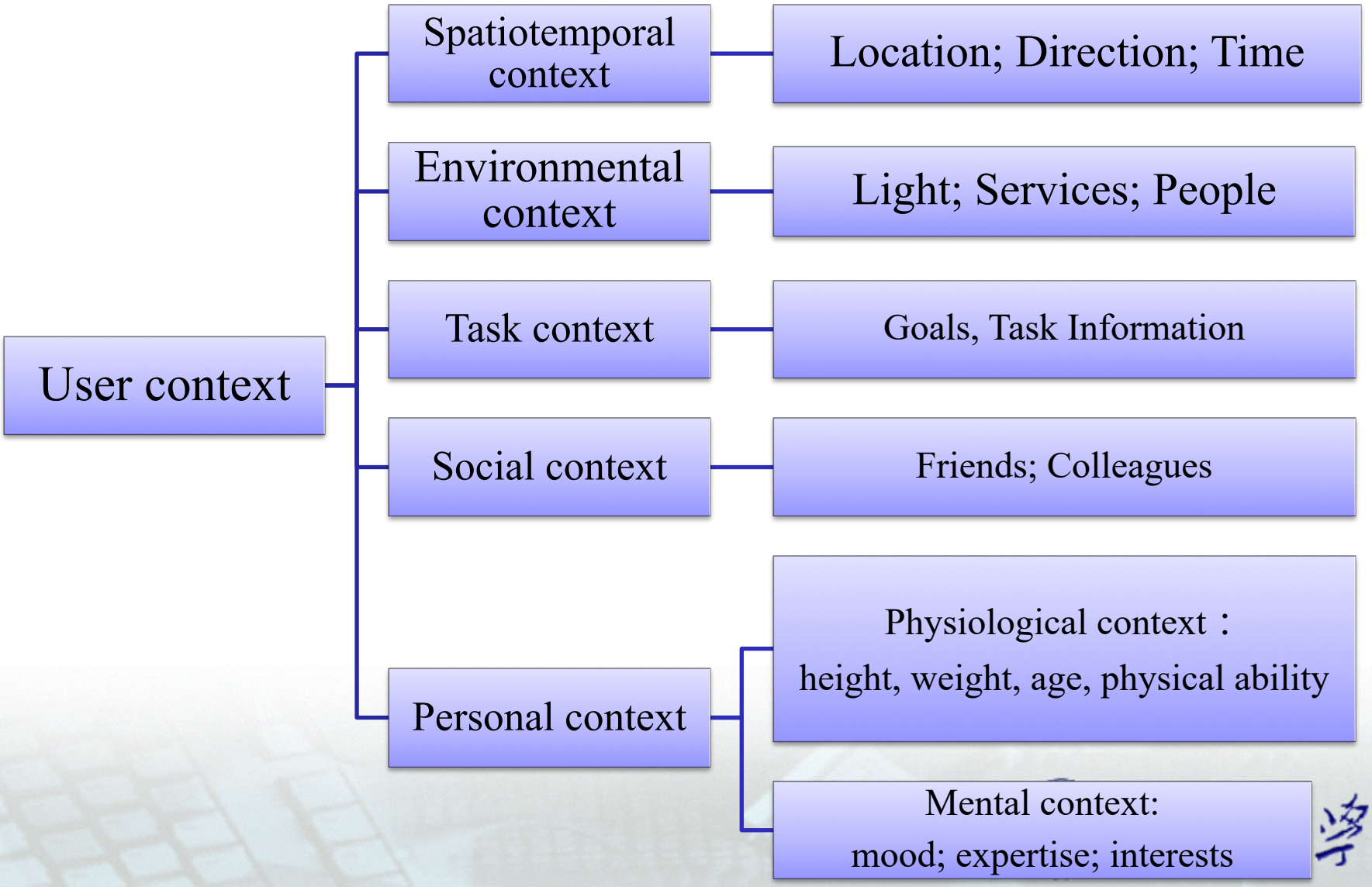
Saracevic's Stratified Model



情境(Context)


User context
Spatiotemporal context
Location; Direction; Time
Environmental context
Light; Services; People
Task context
Goals, Task Information
Social context
Friends; Colleagues
Personal context
Physiological context：
height, weight, age, physical ability
Mental context:
mood; expertise; interests

Practical uses of context

- **Design context-aware IR systems**
  - Learn what information we want by observing our reactions to information;
  - Predict what information we need;
  - Learn how information should be displayed to the user;
  - Indicate how information relates to other information we have seen;
  - Decide who else should be informed about new information.

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contextual searching

搜索任务

- **TASK**
  - *'A piece of work to be done'*

(Oxford English dictionary, 8th ed.)

  - *An 'activity to be performed to accomplish a goal'*

(Hackos and Redish, 1998)

  - *'a set of human actions that contribute to a specific functional objective and ultimately to the output goal of a system'*

(Drury et al., 1987)

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Operationalizing task in IIR research

- Task is fundamental to the design of information retrieval tests, experiments and user studies.
- Within IIR research, task has been used in two ways:
  - As a vehicle to conduct the research
  - As the object of the research

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Task as vehicle

- Task is a component of research design and can be construed as the experimental task used in research that exploits human activity.

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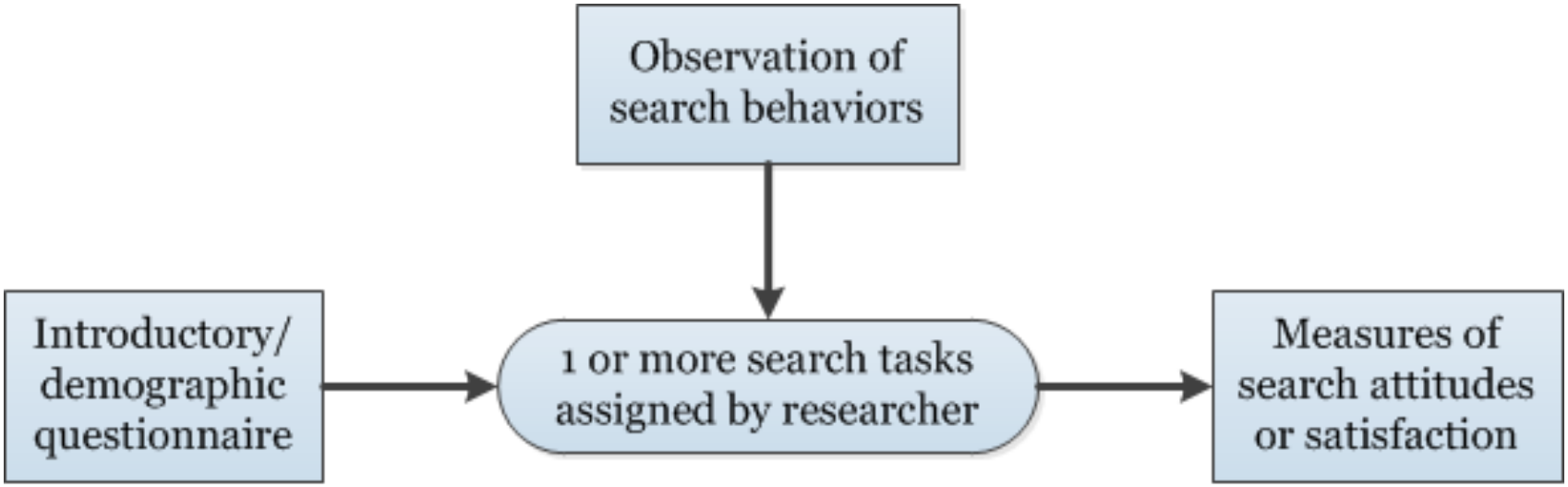
Task as vehicle



Typical Study Design:
Independent Variable = System Feature

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Cranfield tests

- To evaluate indexing systems, Cleverdon used sets of ‘questions’ to test retrieval from documents in metallurgy and aerodynamics.
- Volunteers with topic expertise examined subsets of the collection to create 1500 questions that could be answered using the document set.

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Cranfield tests

- **Specific questions:**
  - Only one document contained the answer
- **General questions:**
  - The answer could be found in several documents.

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Example questions used in Cranfield studies

- #155 technical report on measurement of ablation during flight
- #173 references on lyapunov's method on the stability of linear differential equations with periodic coefficients
- #164 what determines the onset of shock-induced boundary-layer separation?
- #185 experimental studies on panel flutter
- #223 papers on shear buckling of unstiffened rectangular plates under shear

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TREC topics

- Followed the pattern set by Cleverdon
- Including:
  - Need: the question
  - Description: explaining the context and an indication of when a document would be relevant.
  - Topics varied in content and depth over the years

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Example of recent topics used in TREC

- **TREC 2004 Genomics track**

  #45 Mental Health Wellness-1

  Need: What genetic loci, such as Mental Health Wellness 1(MWH1) are implicated in mental health?

  Context: Want to identify genes involved in mental disorders.

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TREC Q&A Track

- **Question Answering (Q&A)Track 1999-2007**
  - focused on the problem of retrieving answers rather than document lists
  - to explore how best to evaluate QA systems.

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Example questions in Q&A Track

- How many calories are there in a Big Mac?
- What two US biochemists won the Nobel Prize in medicine in 1992?
- Who was the first American in space?
- Who is the voice of Miss Piggy?
- What costume designer decided that Michael Jackson should only wear one glove?
- What language is commonly used in Bombay?
- How many Grand Slam titles did Bjorn Borg win?
- Who was the 16th President of the United States?

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TREC Q&A Track: Type of Questions

- **factoid（事实类）**
  - a response is a single [answer-string, docid] pair or the string "NIL".
- **list（列表类）**
  - a response is an unordered, non-empty set of [answer-string, docid] pairs, where each pair is called an instance.
- **definition（定义类）**
  - asks for interesting information about a particular person or thing

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TREC Q&A Track: Evaluation criteria

- **incorrect（不正确）**: not a correct answer;
- **unsupported（不支持）**: the document does not support the answer;
- **non-exact（不确切）**: the string contains more than just the answer (or is missing bits of the answer);
- **locally correct（局部正确）**: the answer-string consists of exactly a correct answer and that answer is supported by the document returned, but a later document contradicts the answer.
- **globally correct（全局正确）**

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Evaluation platform in other countries/language similar to TREC: NTCIR & CLEF

- **NTCIR**
  - NACSIS Test Collections for IR,针对日文和中文
  - National Center for Science Information Systems，NACSIS)
    日本国家科学咨询系统中心
- **CLEF**
  - Conference and Labs of the Evaluation Forum
  - 针对欧洲语言进行的信息检索开放评测平台
  - QA4MRE（Question answering for machine reading）
- **智能答题**

Task as object of research

- **As an Independent variable**
- In this case, characteristics of task are experimentally compared; task becomes an experimental variable and at the same time is also an experimental task.

Marchionini (1989)

- **Closed:**
  - questions for which there was a specific answer.
  - Example: name of a person
- **Open:**
  - questions for which there was no specific answer.
  - Example: *How are power companies coping with the economic problems of global warming?*

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Broder (2002)

- **Navigational task (20%~26%)**
  - to locate a particular Website
- **Informational task (73%~80%)**
  - to locate content concerning a particular topic in order to address an information need of the searcher.
- **Transactional task (30%~36%)**
  - to locate a Website with the goal to obtain some other product

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Gwizdka, J., & Lopatovska, I. (2009).

- **Fact finding (or known-item search)**
  - to find one or more specific pieces of information (e.g., name of a person or an organization, product information, a numerical value, a date).
- **Information Gathering (or topical search)**
  - to collect several pieces of information about a given topic

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Kellar et al. (2006)

- Fact finding:
  - describes the search for a specific piece of information;
- Information gathering:
  - research-like activities whose main purpose is to collect information on a certain topic;
- Browsing:
  - serendipitous surfing where the user has no specific goal in mind referring to the content;
- Transactions:
- Communications:
- Maintenance:

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White, R. W., & Marchionini, G. (2007).

- **Known-item search tasks**
  - Required subjects search for particular pieces of information (e.g., an email address, a name, a date or time)
  - Example*: You are doing some research for a term paper you are writing and need to find the name of the first woman to travel in space and her age at the time of her flight.*

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White, R. W., & Marchionini, G. (2007).

- **Exploratory tasks**
  - Required subjects to gather information on a particular topic to allow them to perform some actions
  - Example: *You are about to depart on a short-tour along the west coast of Italy. The agenda includes a visit to the country's capital, Rome, during which you hope to find time to pursue your interest in modern art. However, you have recently been told that time in the city is limited and you want information that allows you to choose a gallery to visit*.

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Li & Belkin (2008) Facet Analysis of Task

- Source of Task
  - Self, Group, Assigned
- Task Doer
  - Individual, Group
- Time
  - Frequency
  - Length
  - Stage
- Product
  - Physical, Intellectual, Decision, Factual
- Process
  - One-time, Multiple
- Items
  - Named or Not
  - Whole or Part
- Goal
  - Quality
    - Specific, Amorphous, Mixed
  - Quantity
    - Single or multiple goals
- Common attributes of task, e.g.
  - Objective/Subjective task complexity, Urgency, Salience, Difficulty, …

Li, Y., & Belkin, N. J. (2008). A Faceted Approach to Conceptualizing Tasks in Information Seeking. *Information Processing & Management*, *44*(6), 1822–1837.

TREC 2012 Session Track topics

- **Four types of search tasks**
  - **Known-item search:** Factual/Specific goals
  - **Known-subject search:** Factual/Amorphous goals
  - **Interpretive search:** Intellectual/Specific goals
  - **Exploratory search:** Intellectual/Amorphous goals

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Example A. Known-item search

- What is silicone roof coating? What is it best for? What are other solutions regarding roof coating? What is the best material to use if the purpose is cooling down the roof so that the house temperature remains low?

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Example B. Known-subject search

- You would like to write a report about interesting weddings traditions of different cultures, religions, and ethnic groups. Find information about wedding ceremonies in India and how it is different from a typical American wedding.

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Example C. Interpretive search

- You plan to buy a new Toyota Camry car this month, and one of your friends suggested you to buy a Toyota Camry Hybrid instead of non-hybrid car. You want to search and find out what is a hybrid car and decide whether to buy a hybrid or not.

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Example D. Exploratory search

- You are invited (with your significant other) to a wine tasting party at your Australian friend's place on Australian wine. You want to learn something about Australian wine before you attend to party.

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作业二：两个搜索系统的对比评估（20分）

- 作业要求：假设你是一个搜索领域的专家，一份IT杂志邀请你写一篇有关搜索系统评估的文章。请你选择一个特定领域中的两个的搜索系统（注：不包含如Google、百度、Bing等一般搜索引擎），然后对这两个搜索系统进行对比评估。

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期末报告：搜索系统的用户评估实验设计（50分）

- 建议2—3人一组，设计和实施用户搜索实验，对用户搜索行为分析，或对搜索系统进行评估。
- 选题范围：
- 1. 搜索系统的评估实验：可选择一个现有的搜索系统，也可自己设计一个新的搜索系统，或对目前的某个搜索系统界面 / 功能 / 搜索帮助等进行改进，然后征集3-5个被试，进行测试性实验；
- 2. 情境与搜索行为用户实验研究：根据课上内容及阅读材料设计用户实验，检验搜索情境及用户特征如何影响用户的搜索行为或搜索策略；
- 3. 用户搜索行为日志分析：根据老师或网络上可获得的搜索日志数据，对用户搜索行为或搜索策略进行分析。

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TREC 2001 Interactive Track topics

Medical

#1 Tell me three categories of people who should or should not get a flue shot and why.

#2 Find a website likely to contain reliable information on the effect of second-hand smoke.

Buying

#3 Get two price quotes for a new digital camera (3 or more megapixels and 2x or more zoom).

#4 Find two websites that allow people to buy soy milk online.

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TREC 2001 Interactive Track topics

Travel

#5 I want to visit Antarctica. Find a website with information on organized tours/trips there.

#6 Identify three interesting things to do during a weekend in Kyoto, Japan.

Project

#7 Find three articles that a high school student could use in writing a report on the Titanic.

#8 Tell me the name of a website where I can find material on global warming.

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Toms et al. (2008)

Internal structure

- **Parallel**
  - in which the different facets are “on the same level in a conceptual hierarchy”
- **Hierarchical**
  - a single concept for which multiple attributes or characteristics are sought

If the research goal is to examine the search stage effect on users’ search behaviors, you may consider such classification.

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Parallel structure

- Example:
- *Friends are planning to build a new house and have heard that using solar energy panels for heating can save a lot of money. Since they do not know anything about home heating and the issues involved, they have asked for your help. You are uncertain as well, and do some research to identify some issues that need to be considered in deciding between more conventional methods of home heating and solar panels.*

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Hierarchical structure

- Example:
- *Your friends who have an interest in art have been debating the French Impressionism exhibit at a local art gallery. One claims that Renoir is the best impressionist ever, while the other argues for another. You decide to do some research first so you can enter the debate. You consider Degas, Monet and Renoir to construct an argument for the one that best represents the spirit of the impressionist movement. Who will you choose and why?*

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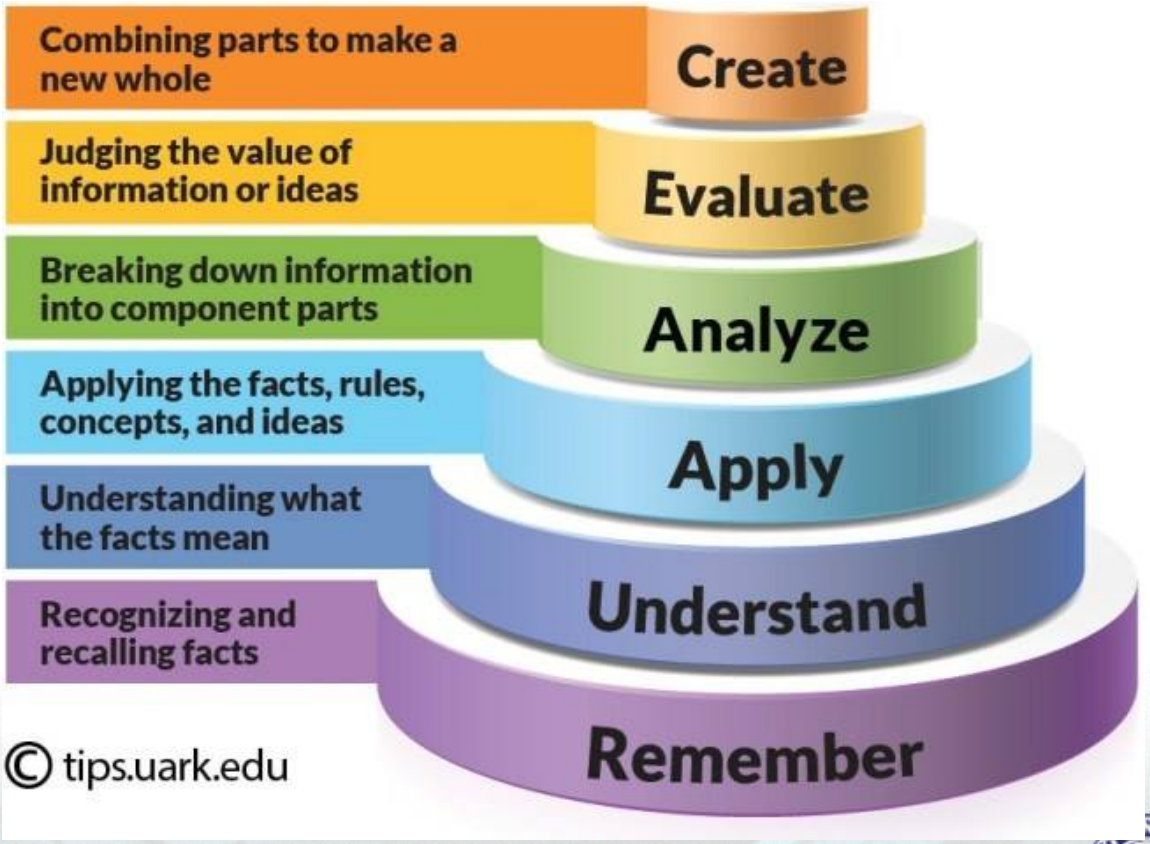
Cognitive Complexity Level

- **Search As Learning**



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本周思考题

- 回忆你最近的一个搜索任务，对它进行详细的描述。包括：
  - 在什么情境下想到要查找信息，
  - 可以使用的设备或搜索系统有哪些？
  - 想要查找哪些信息，
  - 什么样的信息是符合你的要求的，
  - 你如何判断搜索结束完成搜索任务的。
- 综合以上信息，尝试分析这个搜索任务可以归为哪种类型。

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Question on Discussion Board

- Please think of the search tasks that you recently conducted, and try to describe it in detail, including:
  - In what context you realized you would like to find some information?
  - What is the available device or search system for you at that point?
  - What information do you expect to find?
  - What are the criteria that you consider while searching for information?
  - How did you decide that you have completed the search task and stopped searching?
- Based on the above information, what type of task do you think is your search task?

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