



UNDERSTANDING HOW USERS SEARCH & DISCOVER

Ex Libris User Research

May 2015

TOPICS

1

Introduction

2

Log Analysis – what do users search?

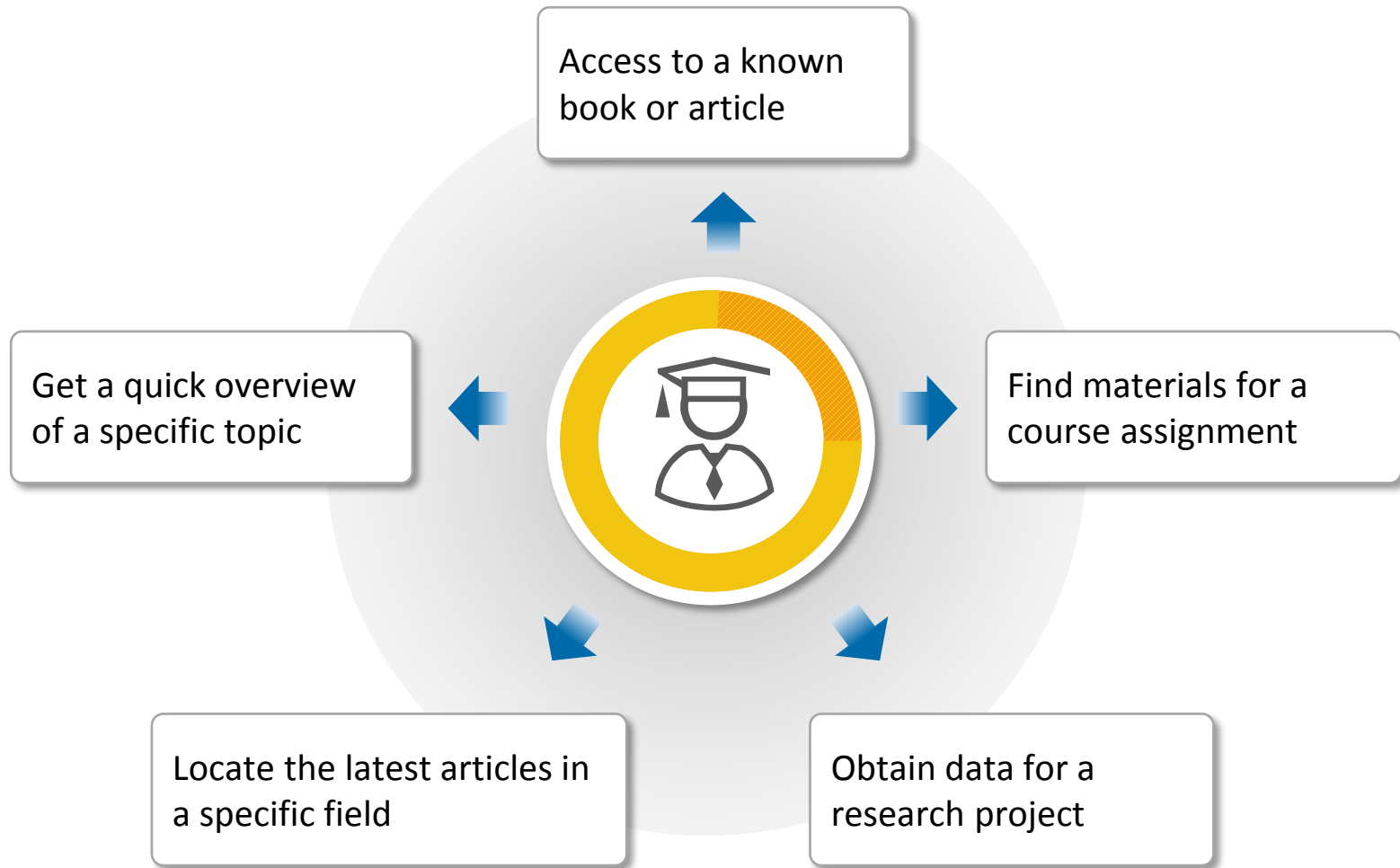
3

User studies – what do users need?

4

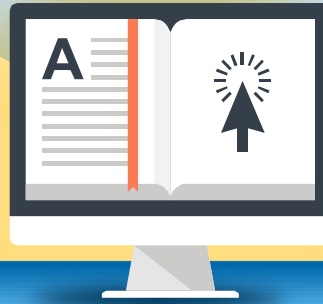
Discovery concepts and ideas

USERS COME WITH DIFFERENT EXPECTATIONS



DISCOVERY INDEXES COME WITH A WEALTH OF MATERIAL

Primo Central (1 billion records)
Primo local collections



Different
material types

Different
disciplines

Different
manifestations
(Physical, Digital,
Electronic)

Different
academic
levels

Different
depths

RESEARCH TO SUPPORT DECISIONS

- User Interface design

- Search and ranking

- Content decisions

- Data handling

- New features



Log Analysis



User Studies



Usability Studies



LOG ANALYSIS

What Do Users Search?

Events



- Search queries
- Search refinements
- Selection activities, such as full-text requests

Key Performance Indicators



- Time to selection
- Number of abandoned searches/session
- Rank of selected items
- Clicks on the Next link
- ...

QUERY TYPES AND THEIR CHARACTERISTICS

Known item searches



- Often > 5 words
- Mixed case
- The inclusion of punctuation
- Phrases that exactly match strings in the system's title index
- Complete citation information (including volume, issue, and page number)

Exploratory (topic) searches

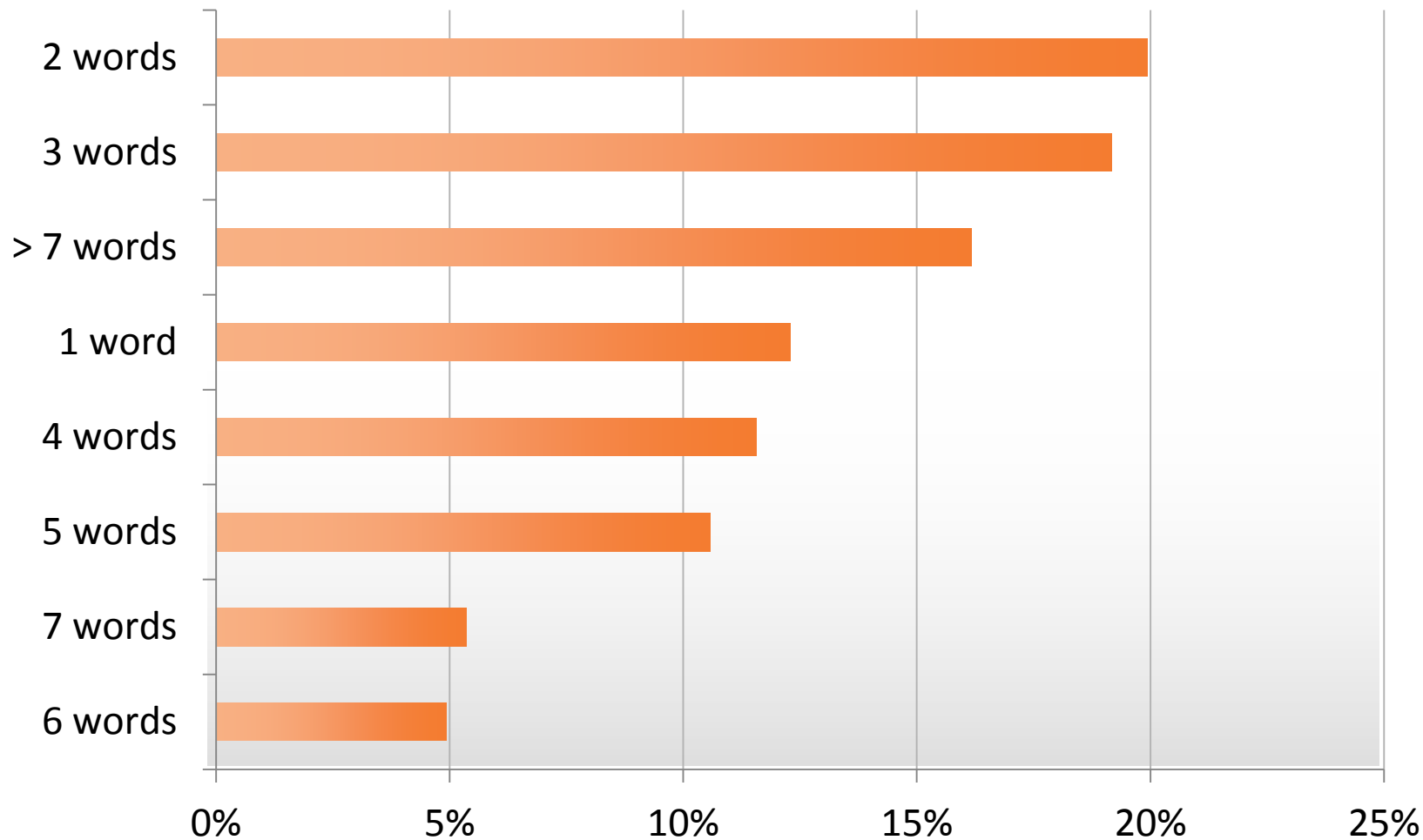


- Usually short (1 – 5 words)
- Broad topic search
 - Expect overview of the topic, (e.g. review articles and reference works)
- Specific topic-based searches
 - Expect more specialized research articles on the subject

LOG ANALYSIS

1	birth outcomes and academic achievement in childhood: a population record linkage study	Known-item query
2	blaxter, hughes and tight	Author-related query
3	international marketing	Broad-topic query
4	economic dependency, gender, and the division of labor at home. american journal of sociology, 100, 652-688.	
5	cognitive systems research	
6	expert systems with applications	
7	journal of vascular surgery	Narrow-topic query
8	a concise history of Australia	
9	fernald, a. et al. (1998). rapid gains in speed of verbal processing by infants in the 2nd year. psychological science, 9, 228-231.	
10	alexithymia anger suppression	

SEARCH DISTRIBUTION – NUMBER OF WORDS



> 50% Known item searches

Examples

Motivating the academically unmotivated: A critical issue for the 21st century

Introduction to Special Relativity, rindler

clark, understanding vulnerability

Sun, J Buys, N, Stewart, D, Shum, D, Farquhar, L, 2011, 'Smoking in Australian university students and its association with socio-demographic factors, stress, health status, coping strategies and attitude, Health Education, Vol. 111 Issue 2, pp.117 132

SUPPORT FOR SEARCH TYPES IN PRIMO

Support for many variations



- Title and author variations
- Missing or added leading articles
- Queries that include the title words in an incorrect order
- Stemming
- ...

Support for entire citations



- Users copy and paste from web pages
- Including enumeration
- In a variety of citation formats



USER STUDIES

**What do users need material for?
Why do they search?**

USER STUDIES OR USABILITY STUDIES

User Studies



The investigation of users (and potential users) for example of a service or system

Usability Studies



The ease of use and learnability of a human-made object (Wikipedia)

Challenge assumptions and gain new insights



Who are the (potential) users and what do they need?

- Understand differences and similarities
 - Identify recurring themes
 - Cluster them into groups with the same characteristics
 - Create Personas and identify common themes
-



Enhance discovery experience and effectiveness



- Library reported user scenarios
- Workshops with librarians from different institutions
 - Harvard University workshop, with participation from Harvard University, Brandeis University, CUNY, Boston College, Boston University, NYU
 - Oxford University workshop
- User interviews/questionnaires

THE QUESTIONNAIRE

- | | |
|----|--|
| 1 | Subject and academic level |
| 2 | What literature do you mostly need for your work |
| 3 | Where do you usually get your literature from |
| 4 | What devices do you use and what for |
| 5 | Preferences/needs when looking for information |
| 6 | Preferred characteristics of material |
| 7 | Where do you usually start your search |
| 8 | Familiarity with topic when starting the search |
| 9 | Favourite web sites (give reasons) |
| 10 | What do you find annoying |
| 11 | Specific use case |

CHALLENGES



Terminology is not consistent

Qualitative vs. quantitative

Changes to the questionnaire – lack of consistency

Providing options leads to suggestive choices, no options to misinterpretation



Scenarios

24 questionnaires and interviews

7 provided by Harvard librarians

11 created in the Harvard workshop

RESPONDENTS (INTERVIEWS/QUESTIONNAIRE)

Total: 24

Canada	2
Germany	5
Israel	1
UK	2
US	14

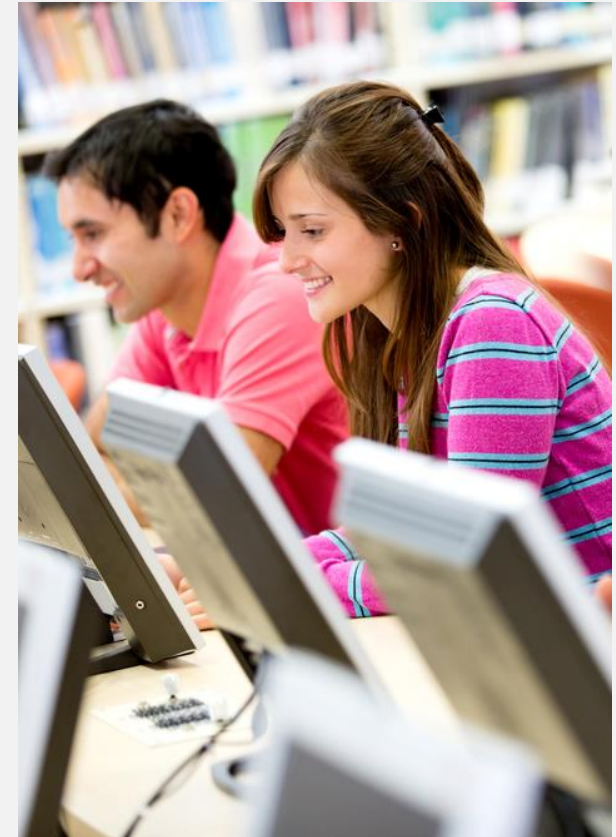
female	14
male	10

Faculty/researcher	3
Graduate	9
PhD student	5
Undergraduate	7

Architecture	1
Humanities	4
Design	1
Law	1
Economics/Business	4
Social Sciences	4
Psychology	1
Urban planning	1
Medicine	2
Sciences	3
Biotechnology	1
Engineering	1

RECURRING THEMES – USER GROUPS

- **Students** often need to build up terminology first
 - **Graduates** to understand their research area first and then narrow it down
 - **Undergraduates** to gain more knowledge for papers/projects
- **Undergraduate students** take most of their resources from reading lists/set text books – but there are exceptions





- **Faculty members and researchers**
know their core publications
 - Are usually (but not always) interested in the newest material
 - Often follow citation trails to find similar material
 - May also follow author trails (known authors and co-authors)
- **Graduates and researchers**
 - Tend to look for thorough lists
 - Often work on projects where they need an overview as well as very specific aspects of a topic

RECURRING THEMES – SUBJECTS

- **Undergraduates in the humanities** work often on papers and essays and need literature for that
- **Undergraduates in the sciences** work towards exams and are often satisfied with text books, they use other literature for occasional tasks
- **Also noteworthy** - the same subject is not taught in the same way in every country: Example
Medicine



USER STORIES - EXAMPLES

One of my most recent tasks was to gather more information about a specific therapy (Photospheres) used for Graf-versus-Host-Disease. Most important for me was to gain a general overview of the topics and the current status of research. I started with searching for photosphere in Google but didn't find anything useful but once I found more material by getting help from peers I really enjoyed to get deep into the subject.

Undergraduate student, Medicine

In researching Scandinavian migration to the United States in the 19th century and its impact on local history and religious institutions, it was actually necessary to research older publications dating from 1820 to 1940 to find more first hand material. No one book or journal article was comprehensive, so many titles had to be reviewed to determine this impact.

Researcher, History

USER STORIES - EXAMPLES

Recently I needed to find research papers to prepare for a talk about semiconductor optical amplifiers. The goal was to both present recent developments in the field but also original publications about the topic to explain the broader concept.

Graduate student, Physics

I work mostly towards exams. I use textbooks a lot and online learning programs. I think this will change when I start working on my PhD next year.

Graduate Student, Medicine

USER STUDIES - CONCLUSIONS



Learning

Many users include learning as a desired part of their information research, e.g. to build up terminology



Exploration

Researchers and graduate students like to follow trails to find relevant material



Differences across disciplines & grades

Different disciplines and academic grades behave differently and have different expectations



DISCOVERY CONCEPTS, FEATURES AND IDEAS

DISCOVERY CORE CONCEPTS




Concepts

- Serendipitous discovery and learning
- Trails
- Browsing

Connections/Entry points

- Usage (e.g. bX)
- References
- Topic clusters
- Parent publication
- Authors
- Author/institutions

EXPLORING SUBJECTS, AUTHORS AND TITLES: BROWSING



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Browse Simple Search

Browse "attack" in authors list

No. of records	Entry
1	Attack, Jeremy
4	Attack, Margaret
3	Attack, Nikki
2	Ataide, Antonio de, Conde de Castanheira,
1	Atal, C. K
1	Atala, Fuad
1	Atalaia, Lucinda
1	Atalar, Kerem Benjamin
1	Atalay, Erdogan 1966-
1	Atallah, Mikhail J



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By title▼ The little

Browse Simple Search

Browse "The little" in titles list

← Previous Next→

No. of records	Entry
1	The little clay cart adaption
1	The little clay cart attributed to
1	The little clay cart translation
1	The little man
1	The long trick
1	The making of DSM 3
1	The making of the 20th century
1	The Manchester Times and Gazette
1	The Manchester Times and Manchester and Salford Advertiser and Chronicle
1	[The march of the women] piano

EXPLORING THE VICINITY: VIRTUAL BROWSE



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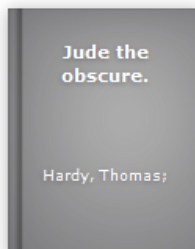
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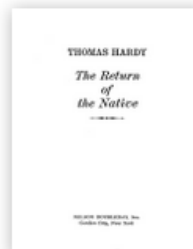
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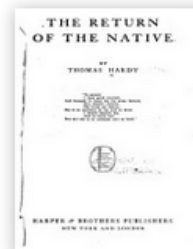
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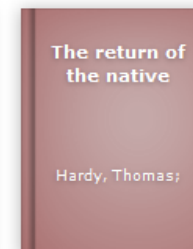
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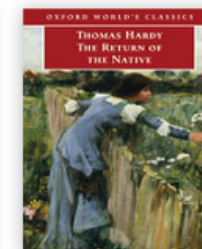
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PR4747 .A1 1929



PR4747 .A1 1962



PR4747.A2 G37 2005


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The return of the native


Hardy, Thomas, 1840-1928 ; Thomas Hardy 1840-1928.

Next »

EXPLORING ARTICLE RELATIONS: THE bX RECOMMENDER

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Creator


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Waggle Dance Distances as Integrative Indicators of Seasonal Foraging Challenges

Margaret J. Couvillon^{1*}, Roger Schürch^{1,2}, Francis

¹ Laboratory of Apiculture and Social Insects, School of Life Sciences, University of Sussex, Brighton, United Kingdom

Abstract

Even as demand for their services increases, honey bees (*Apis mellifera*) in Europe and North America face many challenges that have reduced flower-rich areas. One way to help bees find food is by using the waggle dance, a unique behavior that communicates the location of visited flowers, to make a 2-year survey of seasonal changes in foraging, as indicated by the distance of the dance. In year 3, we determined that the distance/area significantly increased from spring (493 m, 0.1 better quality, before decreasing in autumn (1275 m, 5.1 suggests summer is the most challenging season, with bees. Our study demonstrates that dancing bees as indicators of particular, can show the months when additional forage

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Editor: Guy Smagghe, Ghent University, Belgium

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Competing Interests: The commercial funders Waitrose Ltd. and Burt's Bees hire undergraduate research assistants. They were not involved in any aspect of the authors' adherence to PLOS ONE policies on sharing data and materials.

* E-mail: M.Couvillon@sussex.ac.uk

Introduction

Pollinating insects, including honey bees (*Apis mellifera*), continue to decline in Europe and North America [1–5], even though the demand for their services is increasing [6–8]. The number of managed hives in Great Britain has decreased 75% in the past century; in the United States, the 62% decline from 6 million in the 1940s to 2.3 million in 2008 is even more rapid [5,9]. Honey bees face many challenges including pests [10], pathogens [11] and pesticides [12]. However, independent of these is another

and flower-visiting insects onto a more solid foundation based on empirical evidence.

Determining where foraging animals collect food is valuable in conservation work, and recent years have witnessed an explosion in the use of GPS trackers for this purpose [48]. Although insects

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Conceived and designed the experiments: MJC FLWR. Performed the experiments: MJC. Analyzed the data: MJC RS. Contributed reagents/materials/analysis tools: MJC RS. Wrote the paper: MJC. Commented on manuscript: MJC RS FLWR. Take full responsibility for its content: MJC RS FLWR.

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CLUSTERING BASED ON TEXT MINING

Title

Do **honey bees** average **directions** in the **waggle dance** to determine a **flight direction**?

Description:

The **waggle dance** of the **honey bee** is a **recruitment behavior** used to communicate the location of a resource to a nest mate. There is, however, significant imprecision communicating the **direction** across **waggle runs** in a single **dance**. In this study, we ask whether **honey bee recruits** determine the **direction** of their **flight** based on an average of many **waggle runs**, or on a single **waggle run**. We show that the **distribution of recruit flight directions** is narrower than the **distribution of directions** indicated in the **dance**. We also show that there is a better fit between observed **flight directions** and the prediction of a multiple-**waggle-run**-averaging model than a last-**waggle-run** or other single-**waggle-run** models. These findings substantially weaken hypotheses about the adaptive nature of imprecision in **honey bee recruitment**. [PUBLICATION]

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Properties

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behavior
dance floor
distribution
geographic
direction

averag model
communication
direct
flight
honey bee
recruit

bee
danc
direct indic
flight direct
honey bees
recruitment

bees
dance
direction
follow
polarized light
regression
analysis

run
von frisch
waggle dance

runs
waggl

statistical analysis
waggl run

trap
waggle

Title	Algorithm
Honeybee dances communicate distances measured by optic flow	57.0
The spatial precision of the honey bees' dance communication	54.0
Signals and flexibility in the dance communication of honeybees	54.0
The transfer of information in the dance language of honeybees: progress and problems	50.0
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can get

Without boundaries

Show everything
and we'll try to get
it for you

FROM THE JOURNAL OF INFORMATION SCIENCE CALL FOR PAPERS
(FOR A SPECIAL ISSUE “RECENT ADVANCES ON SEARCHING AS LEARNING”)

- Understanding searching as a human learning process
- When and how learning occurs in the search process
- The relationship between the learning process and searchers' work task contexts
- Features and functionalities to foster learning
- Search interface design in support of learning

PERSONALIZATION: THE SAME DOES NOT WORK FOR ALL

- Topic searches and discipline match

Example: “game theory”



Mathematics

Economics

The diagram shows the text 'Example: “game theory”' in bold blue font. To its right is a blue curved arrow pointing upwards to the word 'Mathematics' and downwards to the word 'Economics'.

- Material types per discipline and academic level

Examples:

- Overview articles vs. in-depth research articles
- Newspaper article included?

PERSONALIZED RANKING EXAMPLE

graphene layer

Search term: graphene layer
By: *Physics student*



rss



Save query



Add page to e-Shelf

Refine My Results

Availability

Full Text Online (25,588)

Peer Reviewed (18,895)

More options ▾

Topic

Graphene (5,785)

Graphite (3,218)

Chemical Vapor Deposition (558)

Raman Spectroscopy (535)

Nanoparticles (300)

Thin Films (290)

Optical properties of graphene (124)

Raman Spectra (98)

Layers (95)

Substrates (91)

More options ▾

Resource Type

Articles (25,236)

Newspaper Articles (1,799)

Show Hot Articles ▾

Results 1 - 10 of 28,934 for Books Articles etc

Sorted by: Relevance ▾



Article

☆ Deep subwavelength plasmonic waveguide switch in double graphene layer structure

Iizuka, H ; Fan, SH

Applied Physics Letters, 2013, Vol.103(23) [Peer Reviewed Journal]

● Full text available

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Article

☆ Double graphene-layer plasma resonances terahertz detector

Ryzhii, V ; Otsuji, T ; Ryzhii, M ; Shur, MS

Journal Of Physics D-Applied Physics, 2012, Vol.45(30) [Peer Reviewed Journal]

● Full text available

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Article

☆ Effect of plasma resonances on dynamic characteristics of double graphene-layer optical modulator

Ryzhii, V ; Otsuji, T ; Ryzhii, M ; Leiman, VG ; Yurchenko, SO ; Mitin, V ; Shur, MS

Journal Of Applied Physics, 2012, Vol.112(10) [Peer Reviewed Journal]

● Full text available

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Article

☆ Electrostatic studies of - interaction for benzene stacking on a graphene layer

Chang, Shouu-Jinn ; Hsun Su, Yen ; Kai Wu, Yang ; Tu, Sheng-Lung

Applied physics letters, 2011, Vol.99(16), pp.163102-163103 [Peer Reviewed Journal]

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PERSONALIZED RANKING EXAMPLE

graphene layer

Search term: graphene layer
By: *Engineering student*



rss



Save query



Add page to e-Shelf

Refine My Results

Availability

Full Text Online (25,588)

Peer Reviewed (18,895)

More options ▾

Topic

Graphene (5,785)

Graphite (3,218)

Chemical Vapor Deposition (558)

Thin Films (290)

Self-assembly (93)

Cvd (82)

Polyaniline (54)

Terahertz (18)

Polyimide (17)

Infrared (6)

More options ▾

Resource Type

Articles (25,236)

Newspaper Articles (4,700)

Show Hot Articles ▾

Results 1 - 10 of 28,934 for Books Articles etc

Sorted by: Relevance ▾



Article

☆ Liquid Crystals: Vertically Aligned Graphene Layer Arrays from Chromonic Liquid Crystal Precursors (Adv. Mater. 4/2011)

Advanced materials, 2011, Vol.23(4), pp.436-437 [Peer Reviewed Journal]

● Full text available

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Article

☆ Electrical characteristics of resistive switching memory with metal oxide nanoparticles on a graphene layer

Cho, Won-Ju ; Im, Hyunsik ; Kim, Dongwook ; Kim, Eun Kyu ; Kim, Young-Ho ; Lee, Dong Uk

Thin solid films : international journal on the science and technology of condensed matter films, 2013, Vol.543, pp.106-109 [Peer Reviewed Journal]

● Full text available

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Article

☆ Engineering of graphene layer orientation to attain high rate capability and anisotropic properties in li-ion battery electrodes

Mukhopadhyay, A. ; Guo, F. ; Tokranov, A. ; Xiao, X. ; Hurt, R.H. ; Sheldon, B.W.

Advanced Functional Materials, 20 May 2013, Vol.23(19), pp.2397-2404

● Full text available

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☆ Vertically aligned graphene layer arrays from chromonic liquid crystal precursors

Guo, F. ; Mukhopadhyay, A. ; Sheldon, B.W. ; Hurt, R.H.

Advanced Materials, 25 January 2011, Vol.23(4), pp.508-513 [Peer Reviewed Journal]



- **Active choices** by the user can for example control order of results in relation to
 - Discipline
 - Material type
 - Recentness
- **Passive choices** – anticipate user's preferences according to her/his history or course association
 - Like Google?
 - Privacy concerns?
 - More targeted but maybe also more restricted?
 - Critical mass of data to perform such analysis per user?
 - Discipline choices according to courses in the reading list?



THANK YOU