

Demonstration Guideline for ACL 2024 submission



MODOC: A Modularized Interface for Flexible Interlinking of Text Retrieval and Generation Functions

Yingqiang Gao¹, Jhony Prada², Nianlong Gu³, Jessica Lam¹,
Richard H.R. Hahnloser¹

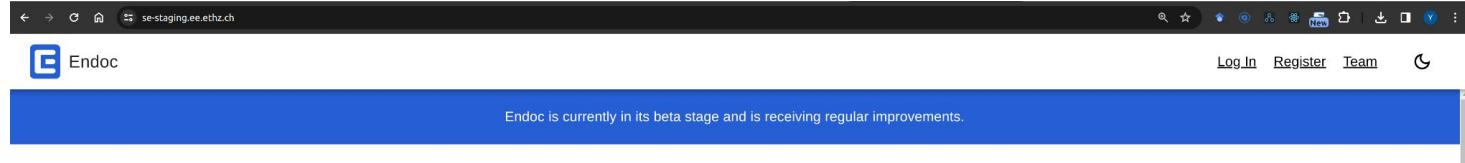
¹Institute of Neuroinformatics, University of Zurich and ETH Zurich

²ETH Zurich

³Linguistic Research Infrastructure, University of Zurich

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Log in and Get started

Use the provided log in credentials

The screenshot shows a web browser window with the URL `se-staging.ee.ethz.ch/login`. The page is titled "Endoc". On the left, a blue box highlights the "Log In credentials:" section, which contains the email `demo@endoc.ethz.ch` and password `demo123`. A blue arrow points from this box to the "Log In" button at the top right of the form. The form itself has fields for "Your personal email" and "Password with 6 characters minimum", both with eye icon password helpers. Below the form are links for "Log In", "OR", "Switch Edu-ID", "Forgotten Password", "Register", and "Email Confirmation". At the bottom, there is a note about agreeing to terms and conditions.

Log In credentials:

email: demo@endoc.ethz.ch
password: demo123

Your personal email

Password with 6 characters minimum

Log In

OR

Switch Edu-ID

By clicking "Log in" or "Switch edu-ID", you agree to our [Terms Of Service](#) and [Privacy Policy](#).

With switch edu-ID you get unrestricted access to the platform if affiliated to a Swiss institute supporting switch.

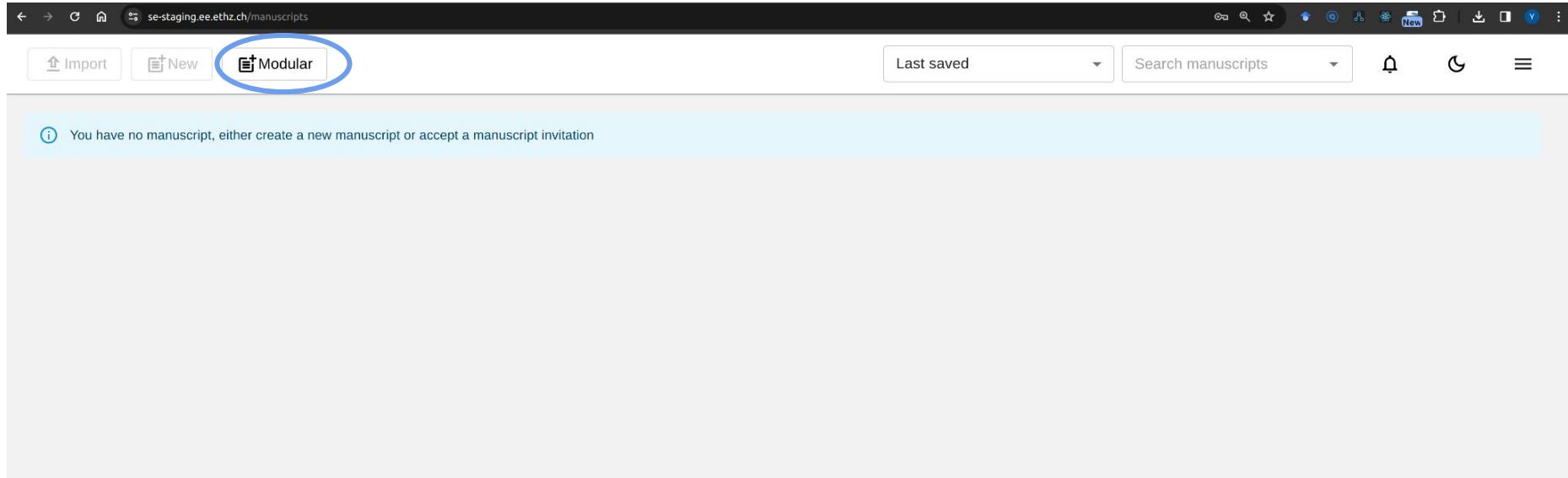
[Forgotten Password](#)

[Register](#)

[Email Confirmation](#)

Log in and Get started

Click on Modular



Construct Manuscript

Click on Write module and construct the manuscript

Zai et al. 2022 bioRxiv

The screenshot shows a web-based manuscript construction interface. At the top, there's a header with a back arrow, forward arrow, refresh button, and a URL bar containing "se-staging.ee.ethz.ch/modular/65f020a2774cbe001a936705". Below the header is a toolbar with several icons: Endoc, Title, a gear icon, and four large blue buttons labeled G, D, W (with a red notification dot), I, S, L, R. A blue circle highlights the W button, and a blue arrow points from it to a text box on the right.

The main interface has a sidebar on the left labeled "Untitled" with a "copy and paste" placeholder. The main content area contains two large text boxes, both with blue borders and arrows pointing from them to the "copy and paste" placeholder in the sidebar.

The top text box contains the title: "Goal-directed vocal planning in a songbird".

The bottom text box contains the following text:

Speech planning is an important part of human communication and the inability to plan speech is manifest in disorders such as apraxia. But to what extent is targeted vocal planning an entirely human ability? Many animals are capable of volitional control of vocalizations (), but are they also capable of planning to selectively adapt their vocalizations towards a target, such as when striving to reduce the pitch mismatch of a note in a song?

Function: Keyword-based Literature Discovery

2. Click “Fire” button

Keywords

Type a keyword (e.g. vocal learning) and press Enter...

search in Title NOT Year Range

A blue arrow points from the 'Input keywords and press Enter' step to the 'Keywords' tab.

1. Input keywords and press Enter

Task: find papers using keywords

4. Click “Fire” button again

Keywords

Type a keyword (e.g. vocal learning) and press Enter...

search in Title NOT Year Range

Suggested keywords from the retrieved papers (click to add):

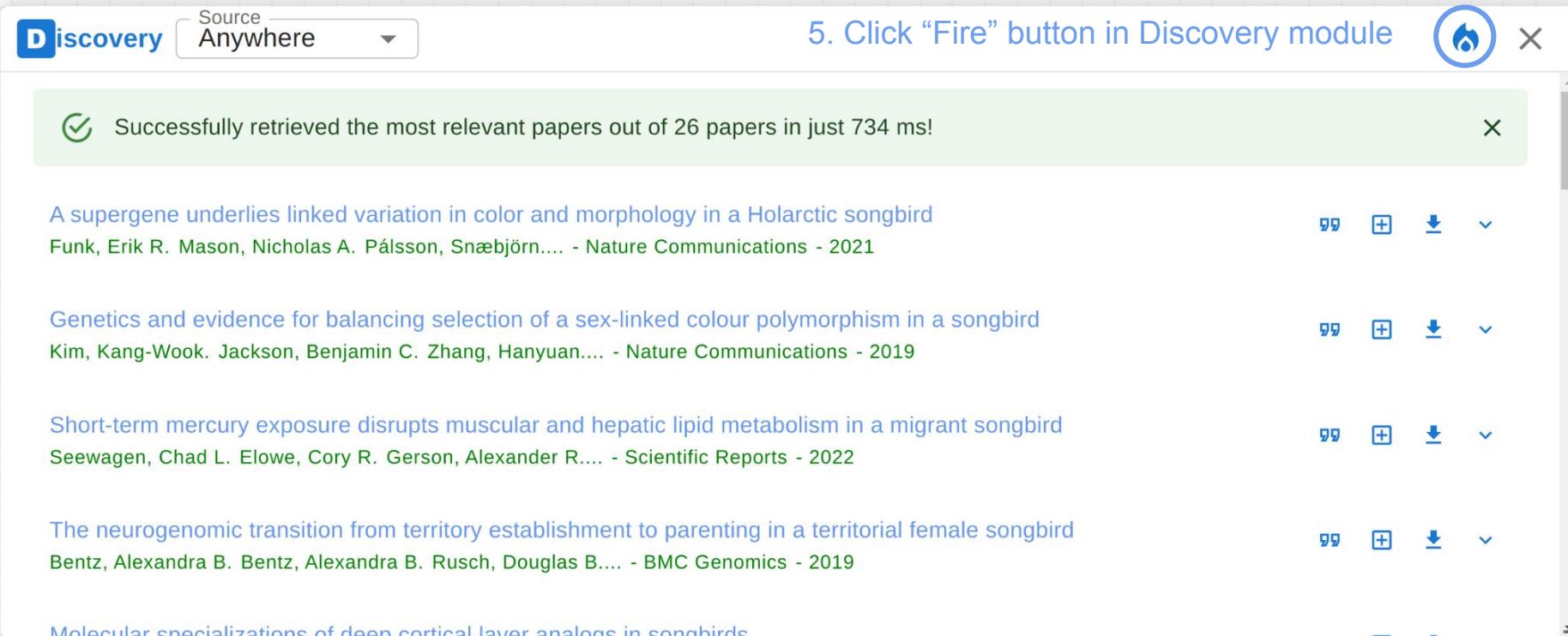
unlikely frontier acoustic spatial structure konik horse

click to add

3. Add suggested keyword to refine the literature discovery results

Function: Keyword-based Literature Discovery

6. Retrieved papers are listed in the Discovery module

Discovery Source Anywhere 

5. Click “Fire” button in Discovery module  

 Successfully retrieved the most relevant papers out of 26 papers in just 734 ms! 

Paper Title	Author(s)	Journal	Year	Action Buttons
A supergene underlies linked variation in color and morphology in a Holarctic songbird	Funk, Erik R. Mason, Nicholas A. Pálsson, Snæbjörn....	Nature Communications	2021	   
Genetics and evidence for balancing selection of a sex-linked colour polymorphism in a songbird	Kim, Kang-Wook. Jackson, Benjamin C. Zhang, Hanyuan....	Nature Communications	2019	   
Short-term mercury exposure disrupts muscular and hepatic lipid metabolism in a migrant songbird	Seewagen, Chad L. Elowe, Cory R. Gerson, Alexander R....	Scientific Reports	2022	   
The neurogenomic transition from territory establishment to parenting in a territorial female songbird	Bentz, Alexandra B. Bentz, Alexandra B. Rusch, Douglas B....	BMC Genomics	2019	   
Molecular specializations of deep cortical layer analogs in songbirds				  

Function: Semantic-based Literature Discovery

1. Set scope in Write module as “Manuscript”

The screenshot shows the 'Write' module interface. At the top, there's a toolbar with a 'Write' button, a 'Scope' dropdown set to 'Manuscript', and a 'Save' button. Below the toolbar, the main area displays a manuscript titled 'Goal-directed vocal planning in a songbird'. The manuscript includes an 'Introduction' section and a detailed text body. The text discusses speech planning, its importance in communication, and examples of vocal planning in humans and animals. It also mentions target-specific vocal planning as a cognitive ability involving sensory targets and motor actions. The bottom of the manuscript section contains a note about event extraction for the clinical domain.

[1] Brecht,Katharina,Hage,Steffen,Gavrilov,Natalja,Nieder,Andreas

Task: find papers using entire manuscript

2. Set scope in Discovery module as “Manuscript”

The screenshot shows the 'Discovery' module interface. At the top, there's a toolbar with a 'Discovery' button, a 'Source' dropdown set to 'Manuscript', and a 'Fire' button (which is circled in blue). Below the toolbar, a success message states 'Successfully retrieved the most relevant papers out of 5909192 papers in just 1866 ms!'. The main area displays a list of five research papers related to vocal planning and speech structures. Each paper entry includes the title, author(s), and publication details, along with download and export icons.

- Sequence and hierarchy in vocal rhythms and phonology
Fitch, W. Tecumseh. - Annals of the New York Academy of Sciences - 2019
- Vocal effort modulates the motor planning of short speech structures
Taitz, Alan. Shalom, Diego. Trevisan, Marcos.- 2018
- Abnormal laughter-like vocalisations replacing speech in primary progressive aphasia
- Journal of the Neurological Sciences - 2009
- SARA speech —Feasibility of automated assessment of ataxic speech disturbance
Grobe-Einsler, M. Grobe-Einsler, M. Faber, J.... - NPJ Digital Medicine - 2023
- Cortical Thickness in Children Receiving Intensive Therapy for Idiopathic Apraxia of Speech

3. Click “Fire” button

Function: Semantic-based Literature Discovery

1. Set scope in Write module as “Selection”

The screenshot shows the 'Write' module interface. At the top, there is a toolbar with a 'Write' button, a 'Scope Selection' dropdown set to 'Selection', and a 'Save' button. Below the toolbar, the main content area displays a manuscript titled 'Goal-directed vocal planning in a songbird'. The title is bolded. Below the title, the word 'Introduction' is followed by a large block of text. A portion of this text is highlighted with a yellow box, specifically the sentence: 'Speech planning is an important part of human communication and the inability to plan speech is manifest in disorders such as apraxia.' A red underline is placed under the word 'apraxia'. The text continues to discuss vocal planning in songbirds, mentioning references [1] Brecht, Katharina et al. 2019, and [2] Veit, Lena et al. 2021.

Goal-directed vocal planning in a songbird

Introduction

Speech planning is an important part of human communication and the inability to plan speech is manifest in disorders such as apraxia. But to what extent is targeted vocal planning an entirely human ability? Many animals are capable of volitional control of vocalizations ([1] Brecht, Katharina et al. 2019, [2] Veit, Lena et al. 2021), but there are also capable of planning to selectively adapt their vocalizations towards a target, such as when striving to reduce the pitch mismatch of a note in a song? Target-specific vocal planning is a cognitive ability that requires extracting or recalling a sensory target and forming or selecting the required motor actions to reach the target. Such planning can be covert or overt. Evidence for covert planning is manifest when a targeted motor change is executed without intermittent practice, e.g., when we instantly imitate a word upon first hearing. Overt planning, by contrast, includes practice, but without access to the sensory experience from which target mismatch could be computed, e.g., when we practice a piano piece by tapping on a table...

Event extraction for the clinical domain is an under-explored research area.

[1] Brecht, Katharina, Hage, Steffen, Gavrilov, Natalja, Nieder, Andreas

Task: find papers using selected content in manuscript

2. Set scope in Discovery module as “Manuscript”

The screenshot shows the 'Discovery' module interface. At the top, there is a toolbar with a 'Discovery' button, a 'Source' dropdown set to 'Manuscript', and a search bar. Below the toolbar, a message indicates 'Successfully retrieved the most relevant papers out of 5909192 papers in just 1580 ms!' with a green checkmark icon. The main content area lists several retrieved papers, each with a preview, title, author(s), and year:

- Pantomime of tool use: looking beyond apraxia
Osiurak, François. Osiurak, François. Reynaud, Emanuelle.... - Brain Communications - 2021
- Vocal effort modulates the motor planning of short speech structures
Taitz, Alan. Shalom, Diego. Trevisan, Marcos. - 2018
- Behavioral, computational, and neuroimaging studies of acquired apraxia of speech
Ballard, Kirrie J. Tourville, Jason A. Tourville, Jason A.... - Frontiers in Human Neuroscience - 2014
- Language Impairments in Individuals With Coffin-Siris Syndrome
Vasko, Ashley. Schrier Vergano, Samantha A. Schrier Vergano, Samantha A.- Frontiers in Neuroscience - 2022
- Abnormal laughter-like vocalisations replacing speech in primary progressive aphasia

3. Click “Fire” button

Function: Paper Summarization

1. Click on paper title to open it in a Read module

The screenshot shows the Discovery interface with a search bar set to "Anywhere". A message at the top says "Successfully retrieved the most relevant papers out of 450 papers in just 1711 ms!". Below are three search results:

- Diel patterns of predation and fledging at nests of four species of grassland songbirds**
Ribić, Christine A. Rugg, David J. Ellison, Kevin....
- Ecology and Evolution - 2021
- Predicting the effects of reservoir water level management on the reproductive output of a riparian songbird**
Hepp, Mathew. Palsson, Eirikur. Thomsen, Sarah K....
- PLoS ONE - 2021
- Carry-Over Effects of Nonbreeding Habitat on Start-to-Finish Spring Migration Performance of a Songbird**

2. Set “Retrieval” to “Highlights”

The screenshot shows the Read 1 module with the following settings: Display All, Retrieval, Granularity Sentence. The paper title is "Predicting the effects of reservoir water level management on the reproductive output of a riparian songbird" by Hepp, Mathew. Palsson, Eirikur. Thomsen, Sarah K. Green, David J. from PLoS ONE (2021). The Abstract section is shown, describing the development of a stochastic model to estimate annual productivity of yellow warblers.

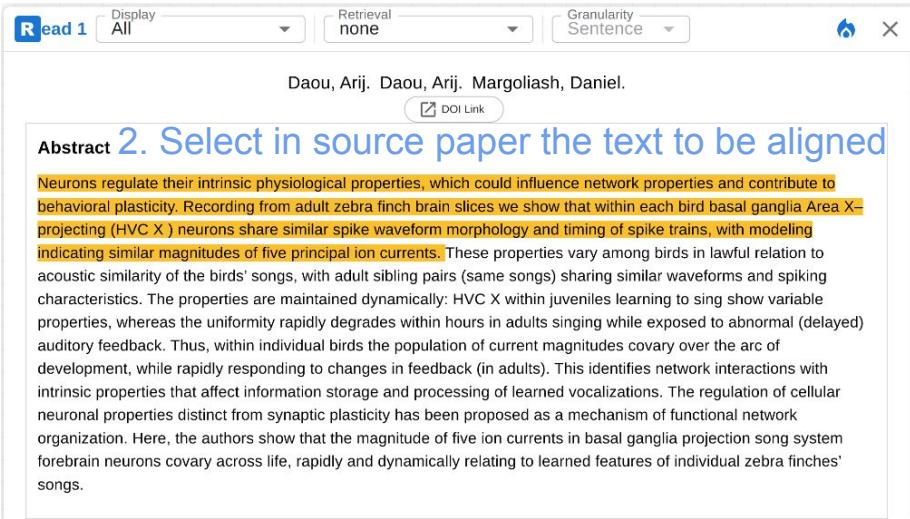
Task: get summary for the reading paper

3. Get summary in listed view

The screenshot shows the Read 1 module with the following settings: Display All, Retrieval Highlights, Granularity Sentence. The paper title is "Predicting the effects of reservoir water level management on the reproductive output of a riparian songbird" by Hepp, Mathew. Palsson, Eirikur. Thomsen, Sarah K. Green, David J. from PLoS ONE (2021). The Highlights section is shown, summarizing the study's objective and methodology.

Function: Text Alignment

1. Set “Retrieval” as “none” for the source paper



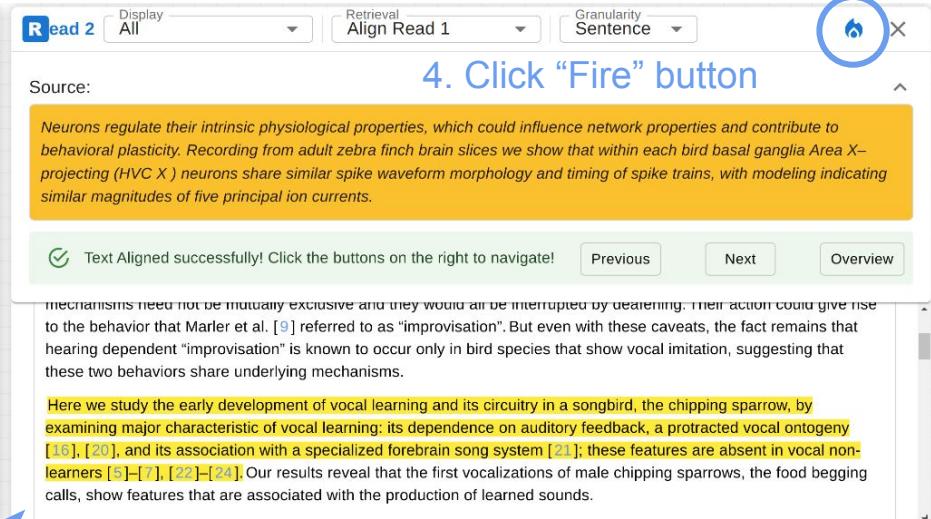
The screenshot shows the 'Read 1' interface with the following settings: Display: All, Retrieval: none, Granularity: Sentence. Below the interface, the author information is listed: Daou, Arij. Daou, Arij. Margoliash, Daniel. A 'DOI Link' button is present. The abstract text is displayed, with the second sentence highlighted in yellow. The text discusses the regulation of intrinsic physiological properties in zebra finch brain slices, mentioning Area X-projecting neurons sharing similar spike waveform morphology and timing of spike trains.

Abstract

2. Select in source paper the text to be aligned

Neurons regulate their intrinsic physiological properties, which could influence network properties and contribute to behavioral plasticity. Recording from adult zebra finch brain slices we show that within each bird basal ganglia Area X-projecting (HVC X) neurons share similar spike waveform morphology and timing of spike trains, with modeling indicating similar magnitudes of five principal ion currents. These properties vary among birds in lawful relation to acoustic similarity of the birds' songs, with adult sibling pairs (same songs) sharing similar waveforms and spiking characteristics. The properties are maintained dynamically: HVC X within juveniles learning to sing show variable properties, whereas the uniformity rapidly degrades within hours in adults singing while exposed to abnormal (delayed) auditory feedback. Thus, within individual birds the population of current magnitudes covary over the arc of development, while rapidly responding to changes in feedback (in adults). This identifies network interactions with intrinsic properties that affect information storage and processing of learned vocalizations. The regulation of cellular neuronal properties distinct from synaptic plasticity has been proposed as a mechanism of functional network organization. Here, the authors show that the magnitude of five ion currents in basal ganglia projection song system forebrain neurons covary across life, rapidly and dynamically relating to learned features of individual zebra finches' songs.

3. Set “Retrieval” as “Align Read 1” for the target paper



The screenshot shows the 'Read 2' interface with the following settings: Display: All, Retrieval: Align Read 1, Granularity: Sentence. A blue circle highlights the 'Align Read 1' button. Below the interface, the text 'Source:' is followed by a large yellow box containing the first sentence of the abstract. The text discusses the regulation of intrinsic physiological properties in zebra finch brain slices, mentioning Area X-projecting neurons sharing similar spike waveform morphology and timing of spike trains. At the bottom, a success message says 'Text Aligned successfully! Click the buttons on the right to navigate!' with 'Previous', 'Next', and 'Overview' buttons.

Source:

Neurons regulate their intrinsic physiological properties, which could influence network properties and contribute to behavioral plasticity. Recording from adult zebra finch brain slices we show that within each bird basal ganglia Area X-projecting (HVC X) neurons share similar spike waveform morphology and timing of spike trains, with modeling indicating similar magnitudes of five principal ion currents.

Text Aligned successfully! Click the buttons on the right to navigate!

Previous Next Overview

5. The most relevant contents are highlighted in the paper (brightness scales to relevance)



Task: given a text in source paper, find its most relevant content in target paper

Function: Text Generation

Task: generate a citation sentence for the reading paper

1. Set the API as “Citation Generation”

2. Select the paper to generate citation sentence

3. Select the citation intent, e.g. as “background”

The screenshot shows a user interface for generating text. At the top, there are three dropdown menus: 'Select API' set to 'Citation Genera...', 'Paper to cite' set to 'Diel patterns o...', and 'Citation intent' set to 'background'. To the right of these is a blue circular button with a flame icon labeled 'Fire' and a close 'X' button. Below the interface, a text input field contains the generated sentence: 'In #REFR, the authors present a model for songbirds that learns to predict the next syllable in a bird's song.' To the right of the text input is an 'Insert' button with a clipboard icon. At the bottom left, the text 'generated citation sentence' is displayed in blue.

Example Workflow: Retrieve and Cite

Task: find papers to cite for the text “Many animals are capable of volitional control of vocalizations ()”

Zai et al. 2022 bioRxiv

The screenshot shows the EndNote software interface with a browser window overlay. The browser window displays a search query: "Goal-directed vocal planning in a songbird". The main EndNote window has a toolbar with icons for Enddoc, Write, Scope Selection, and Save. A modal window titled "Keywords" is open, showing the input "songbirds" and a suggestion list with "addition", "nogo", and "onset". Below this is a "Discovery" panel showing a retrieved paper: "Volitional control of vocalizations in corvid songbirds" by Brecht, Katharina F., Hage, Steffen R., Gavrilov, Natajja.... - PLoS Biology - 2019. A blue arrow points from the text "5. Click ‘Fire’ button" to the "Discovery" panel's "Fire" button, which is circled in blue.

1. Select scope “Selection”
Goal-directed vocal planning
in a songbird

Speech planning is an important part of human communication and the inability to plan speech is manifest in disorders such as apraxia. But to what extent is targeted vocal planning an entirely human ability? Many animals are capable of volitional control of vocalizations (), but are they also capable of planning to selectively adapt their vocalizations towards a target, such as when striving to reduce the pitch mismatch of a note in a song?

2. Select text in the manuscript with the mouse

3. Input keyword “songbirds” and press Enter

Keywords

Keywords

Title:songbirds Type a keyword (e.g. vocal learning) and press Enter...

Suggested keywords from the retrieved papers (click to add):

addition + nogo + onset +

4. Select scope “Manuscript”

Discovery Source Manuscript

Successfully retrieved the most relevant papers out of 1 papers in just 202 ms!

Volitional control of vocalizations in corvid songbirds

Brecht, Katharina F., Hage, Steffen R., Gavrilov, Natajja.... - PLoS Biology - 2019

5. Click “Fire” button

Example Workflow: Retrieve and Cite

Task: find papers to cite for the text “Many animals are capable of volitional control of vocalizations ()”

Zai et al. 2022 bioRxiv

The screenshot illustrates a digital workflow for academic research, specifically for finding and citing papers related to the task of finding papers. The interface includes:

- Title Bar:** Shows the URL se-staging.ee.ethz.ch/modular/65f020a2774cbe001a936705.
- Search Results:** A list of retrieved papers, with the first one highlighted:
 - Title:** Goal-directed vocal planning in a songbird
 - Abstract:** Speech planning is an important part of human communication and the inability to plan speech is manifest in disorders such as apraxia. But to what extent is targeted vocal planning an entirely human ability? Many animals are capable of volitional control of vocalizations ([1] K. F. Brecht et al., [2019]), but are they also capable of planning to selectively adapt their vocalizations towards a target, such as when striving to reduce the pitch mismatch of a note in a song?
 - Citation:** [1] K. F. Brecht, S. R. Hage, N. Gavrilov, A. Nieder, "Volitional control of vocalizations in corvid songbirds", PLoS Biology, [2019].
- Keywords Panel:** Shows a search bar for "songbirds" and a list of suggested keywords: addition, nogo, onset.
- Abstract View:** Displays the abstract of the selected paper:

Volitional control of vocalizations in corvid songbirds
Brecht, Katharina F., Steffen R. Gavrilov, Natalja... - PLoS Biology - 2019

Abstract
Songbirds are renowned for their acoustically elaborate songs. However, it is unclear whether songbirds can cognitively control their vocal output. Here, we show that crows, songbirds of the corvid family, can be trained to exert control over their vocalizations. In a detection task, three male carrion crows rapidly learned to emit vocalizations in response to a visual cue with no inherent meaning (go trials) and to withhold vocalizations in response to another cue (catch trials). Two of these crows were then trained on a go/nogo task, with the cue colors reversed, in addition to being rewarded for withholding vocalizations to yet another cue (nogo trials). Vocalizations in response to the detection of the go cue were temporally precise and highly reliable in all three crows. Crows also quickly learned to withhold vocal output in nogo trials, showing that vocalizations were not produced by an anticipation of a food reward in correct trials. The results demonstrate that corvids can volitionally control the release and onset of their vocalizations, suggesting that songbird vocalizations are under cognitive control and can be decoupled from affective states. Songbirds are renowned for their acoustically elaborate songs, but it is unclear whether they have cognitive control over their vocal output. Using operant conditioning, this study shows that carrion crows, songbirds of the corvid family, can exert control over their vocalizations.
- Annotations:** Handwritten-style annotations in blue highlight the steps:
 - 8. Cite the correct paper in the cursor position
 - 6. Read the abstract
 - 7. Cite the paperBlue arrows point from the text labels to the corresponding UI elements.

Example Workflow: Generate and Check

Task: Generate a citation sentence for a paper and check against the paper

1. Select relevant sentences in a paper

The screenshot shows a paper reading interface with the following details:

- Header: Read 1, Display All, Retrieval none, Granularity Sentence.
- Title: Vocal learning promotes patterned inhibitory connectivity (2017)
- Journal: Nature Communications
- Authors: Miller, Mark N., Cheung, Chung Yan J., Brainard, Michael S.
- Abstract: Skill learning is instantiated by changes to functional connectivity within premotor circuits, but whether the specificity of learning depends on structured changes to inhibitory circuitry remains unclear. We used slice electrophysiology to measure connectivity changes associated with song learning in the avian analog of primary motor cortex (robust nucleus of the arcopallium, RA) in Bengalese Finches. Before song learning, fast-spiking interneurons (FSIs) densely innervated glutamatergic projection neurons (PNs) with apparently random connectivity. After learning, there was a profound reduction in the overall strength and number of inhibitory connections, but this was accompanied by a more than two-fold enrichment in reciprocal FSI-PN connections. Moreover, in singing birds, we found that pharmacological manipulations of RA's inhibitory circuitry drove large shifts in learned vocal features, such as pitch and amplitude, without grossly disrupting the song. Our results indicate that skill learning establishes nonrandom inhibitory connectivity, and implicates this patterning in encoding specific features of learned movements. Complex motor behaviors such as birdsong are learned through practice and are thought to depend on specific excitatory connectivity in premotor circuits.

2. Generate the citation sentence for the paper

The screenshot shows a citation generation interface with the following details:

- Header: Generation 1, Select API Citation Genera..., Paper to cite Vocal learning ..., Citation intent background.
- Text area: The vocal learning hypothesis #REFR proposes that the evolution of language was driven by the need to communicate about the environment.|
- Buttons: Insert (with a clipboard icon).

4. Click “Fire” button

The screenshot shows a paper reading interface with the following details:

- Header: Read 1, Display All, Retrieval Align Generation 1, Granularity Sentence.
- Text area: Source: The vocal learning hypothesis #REFR proposes that the evolution of language was driven by the need to communicate about the environment.
- Message: ✓ Text Aligned successfully! Click the buttons on the right to navigate!
- Buttons: Previous, Next, Overview.
- Text below: generating appropriate behavior. Nonrandom patterns of connectivity among excitatory neurons are a feature of many systems, and plasticity of specific excitatory connections is considered central to the capacity of networks to produce appropriate output 5–8. However, whether learning shapes inhibitory connectivity to achieve comparable specificity 9,10 or instead promotes diffuse, nonspecific inhibition 11 is unclear. The development of temporally precise activation of a diffuse inhibitory network may be sufficient to structure premotor activity during vocal learning 12, yet formation of specific inhibitory connectivity in simulated networks is also sufficient to stably encode complex activity patterns 13. This motivated us to ask how learning shapes inhibitory connectivity in songbirds, where robust vocal learning is subserved by a well-characterized premotor network. We used a slice preparation of the avian vocal premotor nucleus RA (Fig. 1a) to examine changes to motor circuitry over the course of vocal learning. Glutamatergic RA projection neurons (PNs) that innervate vocal and respiratory motoneurons 14 produce highly structured activity

5. Check the generated citation sentences against the aligned text in the paper for factuality and faithfulness

```
step: fur 64 bytes from 200.221.2.45: icmp_seq=0 ttl=242 time=68.921 ms
$ (th) 64 bytes from 200.221.2.45: icmp_seq=1 ttl=242 time=73.429 ms
$ (th) 64 bytes from 200.221.2.45: icmp_seq=2 ttl=242 time=90.356 ms
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    64 bytes from 200.221.2.45: icmp_seq=4 ttl=242 time=68.253 ms
    64 bytes from 200.221.2.45: icmp_seq=5 ttl=242 time=76.845 ms
    64 bytes from 200.221.2.45: icmp_seq=6 ttl=242 time=74.079 ms
    64 bytes from 200.221.2.45: icmp_seq=7 ttl=242 time=84.587 ms
    64 bytes from 200.221.2.45: icmp_seq=8 ttl=242 time=74.533 ms
    64 bytes from 200.221.2.45: icmp_seq=9 ttl=242 time=77.785 ms
)
}
});
```

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