

rs, mainly British, were living in some squalor; the other exhibitions were **IN** houses, old shops, small factory spaces, offices and warehouse example. The weather might be described as 'wet' or 'dry' (W or D) and **IN** a humid temperate climate such as Britain experiences, it might curriculum is delivered. One powerful message put across by the curriculum **IN** most schools is that knowledge can be divided into compartments. Trouble, we do, but it's not like the trouble we had half an hour ago, when **IN** fact there were three lines, sections of which there were no trails to read aloud to others. Opportunities for oral **READING** arise naturally **IN** the course of the day; for instance, in the activity of group prediction. Computer may differ from traditional hand-made **CONCORDANCES** **IN** several ways. One is that they will be much more complete: the text is understood until he reached Milan. 'How old were you when you arrived' **IN** Italy?' The American journalist broke into his thoughts. 'I had just seen the Museum and the Museum of Modern Art, keen in discerning what was good **IN THE** arts of many ages and styles. As for working art critics, the uttering official Brian Hill, who felt it necessary to take aside both captains **IN** the **21<sup>ST</sup>** minute and warn them about each team's tactics. We read. (2) Operational information has undergone several media revolutions **IN** the last **CENTURY**. In principle, now that operational information is year to year (reflecting to some extent the ownership of the biggest hits **IN** each year), the aggregate market share of the five biggest companies is a narrowing of the focus from arts education in general, to one area **IN** particular, namely English lessons and the fictional literature type. This title or the festival of the horse was, shall I say dreamed up, erm and **IN** fact we had one or two horses, Clydesdale horses, on show down a brace of exquisitely faded woods. It was merely that he never wanted **IN** a tournament round to risk anything which might upset his ende

## Reading concordances with algorithms: using FlexiConc for children's literature in CLiC

In the hands-on session, we will use FlexiConc to study literary fiction via the CLiC web app (Mahlberg et al. 2020a).

This document serves as a step-by-step guide to the activities.

Our case study examines body part nouns in 19<sup>th</sup> century children's literature. It aims to find repeated patterns of language use supported by FlexiConc. Patterns of body language serve as a useful example because there are textual similarities across different nouns (cf. Mahlberg 2013, Mahlberg et al. 2020b).

<https://cllc-fiction.com/flexiconc>

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## Part 1: technical steps

In this part, we will take you through a pre-defined set of analysis steps using FlexiConc in CLiC. Don't think too much about the concordance lines resulting from your steps just yet – you'll get a chance to do that in the second part.

### Activity 1: running a concordance search in FlexiConc

**Background:** This step explains how to create a concordance using the FlexiConc mode in CLiC. The concordance search is the basis for all subsequent steps

You will search for *hands* in *non-quotes*, that is, all parts of the ChiLit novels that are outside of quotation marks. All further activities will be based on this initial concordance.

1. To use FlexiConc in CLiC, simply select the FlexiConc tab to the right of the page. The first step is to choose a corpus, a subset, and query terms.
2. Enter the search term **hands** in **non-quotes** of the **ChiLit** corpus. The search term is what we call the 'node'.
3. After setting your search terms, click the **confirmation button** to start searching the corpus.
4. You will see the resulting concordance in the main window.

Search in CLiC

Search the corpora:

ChiLit - Children's Literature X

Only in subsets:

Non-quotes

Search for terms:

hands

Whole phrase  Any word



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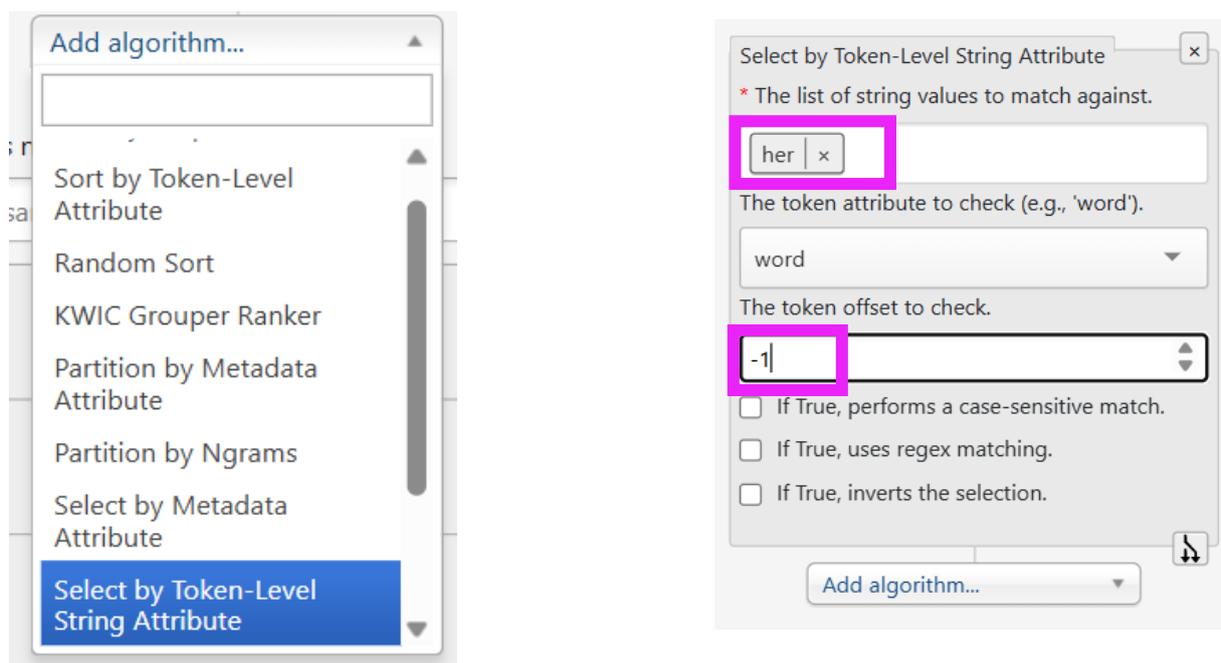
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## Activity 2: zooming in – select by a token-level string attribute

**Background:** We will select lines where the token immediately to the left of the node (= the body part noun *hands*) is *her*. The word *her* ('string value') is specified in the uppermost field, and the position -1 corresponds to the 'token offset'. The token offset specifies the position relative to the node, where negative values count 'downwards' from the left of the node term (-1, -2, ...), and positive values count 'upwards' (1,2, ...).

1. Set the **string value** to **her**
2. Set the **token offset** to **-1**
3. All other settings remain unchanged



Your results should look like this:

	Node	Right	Book	In bk.
	her elbows on the drawing-board before her, and clasping her hands	over her face, seemed for some minutes to be thinking	LadyAud	█
	while she sat silently thinking, she removed one of her hands	from before her face, and fidgeted nervously with the ribbon	LadyAud	█
	her great blue eyes glittering in the dusk, and her hands	clutching at the black ribbon about her throat, as if	LadyAud	█
	the wood-work at his side, and put one of her hands,	which had grown white in her new and easy service	LadyAud	█
	still sat with her face averted from her lover, her hands	hanging listlessly in her lap, and her pale gray eyes	LadyAud	█
	looking as fresh and radiant as the flowers in her hands.	The baronet caught her in his strong arms as she	LadyAud	█
	shoulders, folded her work, shut her work-box, and crossing her hands	in her lap, sat with her gray eyes fixed upon	LadyAud	█
	I know it very well indeed." "My lady warmed her hands	once more, and then taking up the big muff which	LadyAud	█
	sat with work primly folded upon her lap, and her hands	lying clasped together on her work, and never stirred when	LadyAud	█

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## Activity 3: adding information to concordance lines – annotate with sentence transformers

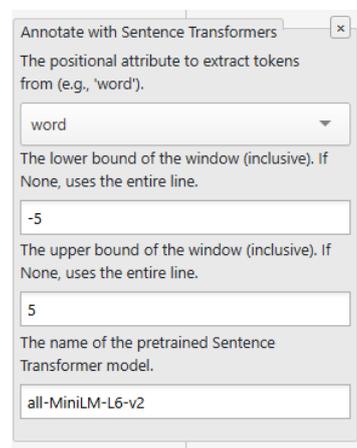
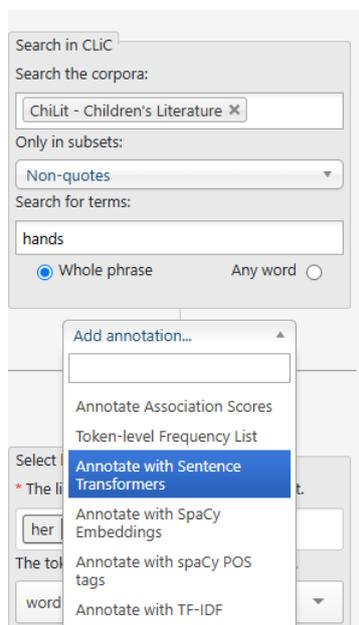
**Background:** *Annotation* refers to the (automatic) addition of further information to the concordance lines. In corpus linguistics, such information is typically added in the form of tags. Here we add information on how ‘similar’ concordance lines are. This similarity is based on similarity scores generated with the help of sentence transformers from large language models (Reimers & Gurevych 2019).

The embedding annotations that sentence transformers provide can form the basis for *clustering* algorithms (cf. section 5). In FlexiConc, clustering is used to form partitions based on the similarity between concordance lines.

As illustrated in the second screenshot below, our annotation algorithms can use a **context window** with upper and lower bounds.

! Note: Annotations are different from algorithms in that you won’t see immediate changes to your concordance after running an annotation step. Adding annotation means adding tags, or in the case of sentence transformers, embeddings that can then be *used by* certain algorithms.

1. **Scroll up** to the query to find the **add annotation** menu.
2. Select **annotate with Sentence Transformers**
3. In the option window, set the **lower bound to -5** and the **upper bound to 5**. This determines which part of the concordance is used to calculate embeddings. (So sentences are not really sentences, but stretches of text defined by word length)
4. Click **confirm** in the concordance window.



## Activity 4: Clustering with embeddings

### Background:

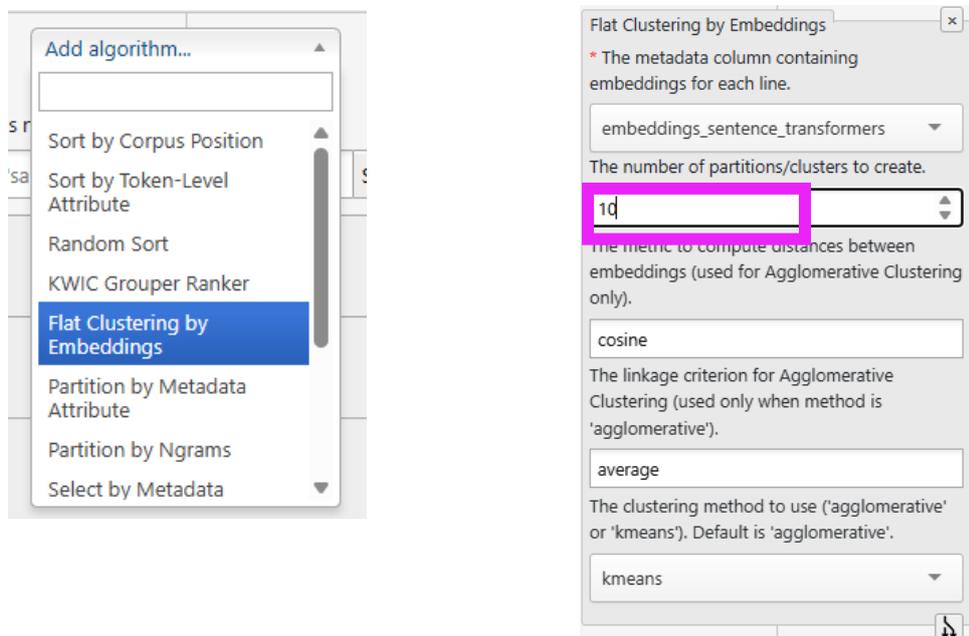
Clusters are groups of concordance lines that are more similar to one another than to the remaining lines in the concordance. In the clustering methods FlexiConc supports in CLiC, the analyst determines how many groups are formed. The clustering algorithm produces precisely that number of concordance groups so that similar lines appear together.

To perform clustering, you first need to annotate the concordance with one of the available embedding methods (cf. section 3). The similarity scores resulting from this annotation serve as the basis for the clustering algorithm to form groups.

In this example, we use **k-means** clustering. On the scikit-learn website, you can find more details about how different clustering algorithms work: <https://scikit-learn.org/stable/modules/clustering.html>.

To perform a clustering, scroll down to **Add algorithm**.

1. Choose **Flat clustering by embeddings**
2. Change the **number of clusters** to **10** and leave everything else as-is.



The results of the clustering algorithm are displayed as **partitions**. So in practice, a partition is a cluster. The first group of concordance lines – cluster 0 – is uncollapsed by default, so you can see all the lines that the clustering algorithm puts together in cluster 0. You can collapse and uncollapse clusters by clicking on their partition labels.

	Partition	hands	Cluster_0
		her	hands
in the towns of Norway. ¶ "Oh!" exclaimed Erica, dropping		her	hands
at her words; and as she spoke she moved		her	hands
hoarse laugh rang through the banqueting hall. Matilda put		her	hands
slap me, I would--" she covered her face with		her	hands
am sure I wish that--_that_ island----		her	hands
you will begin to hate me now!" ¶ Leila removed		her	hands
see it--she was now covering her eyes with		her	hands
heart, and He shall direct thy path." She removed		her	hands
could not stand it, she covered her face with		her	hands
glance she threw at Miss Forest. Annie stood with		her	hands
again covered her face, and bowed her head over		her	hands
me. I must to the kitchen," said Christina, crossing		her	hands
and apple-checked, entered with a bowl of cream in		her	hands
I'll tell you what it is,' said Amy folding		her	hands
began to speak at once, but Dora put up		her	hands
fur coat and a lot of yellow flowers in		her	hands
Meta, and bring my things. R. M." ¶ Ethel put		her	hands
to be hurt whenever Mary was taken out of		her	hands
But why don't you scream now?' Alice asked, holding		her	hands
ARE OLD, FATHER WILLIAM," said the Caterpillar. ¶ Alice folded		her	hands
the little woman ran off towards the town, wringing		her	hands
over with the best dragon poison, and--" ¶ Effie clasped		her	hands
her hair flying up over the housetops. She put		her	hands
welcoming you. Hold out your hands." ¶ Griselda held out		her	hands
said Mother, "oh, yes," and Bobbie and Peter felt		her	hands
we had, honour bright I would." ¶ She held out		her	hands
	Partition	hands	Cluster_1
	Partition	hands	Cluster_2

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## Activity 5: branching out – navigating the analysis tree

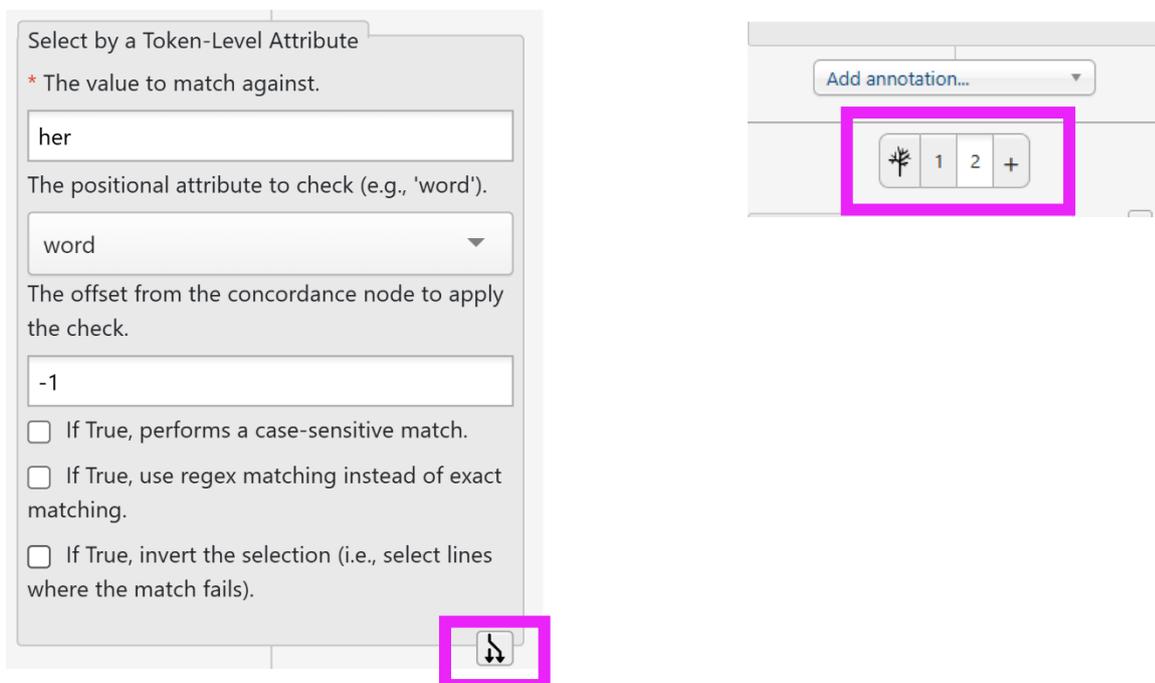
### Background:

A key feature of FlexiConc is its analysis tree. An analysis tree documents all the algorithms that are applied in the course of one specific concordance analysis. The tree provides two key advantages:

- 1) Research documentation: **the tree tracks all steps of your analysis**, and the tree itself can be shared and restored (see section 7).
- 2) We can quickly return to a previous step and take alternative routes by creating new branches.

Here, we use 2) to examine *his + hands* in the same way that we selected concordance lines for *her + body-part noun*.

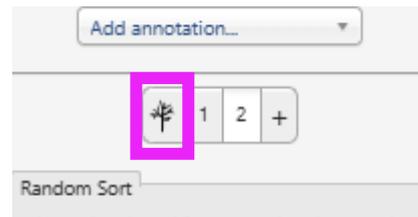
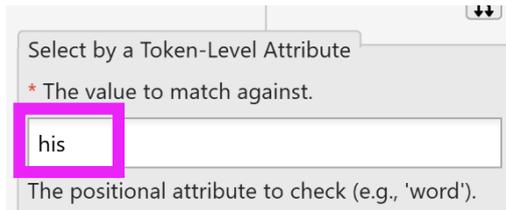
1. **Scroll up** to the previous node *Select by a token-level attribute* where you selected *her*.
2. Click on the **branch** icon in the bottom right corner.



This step creates a **new branch** where all steps up until the one you branched off from are the same.

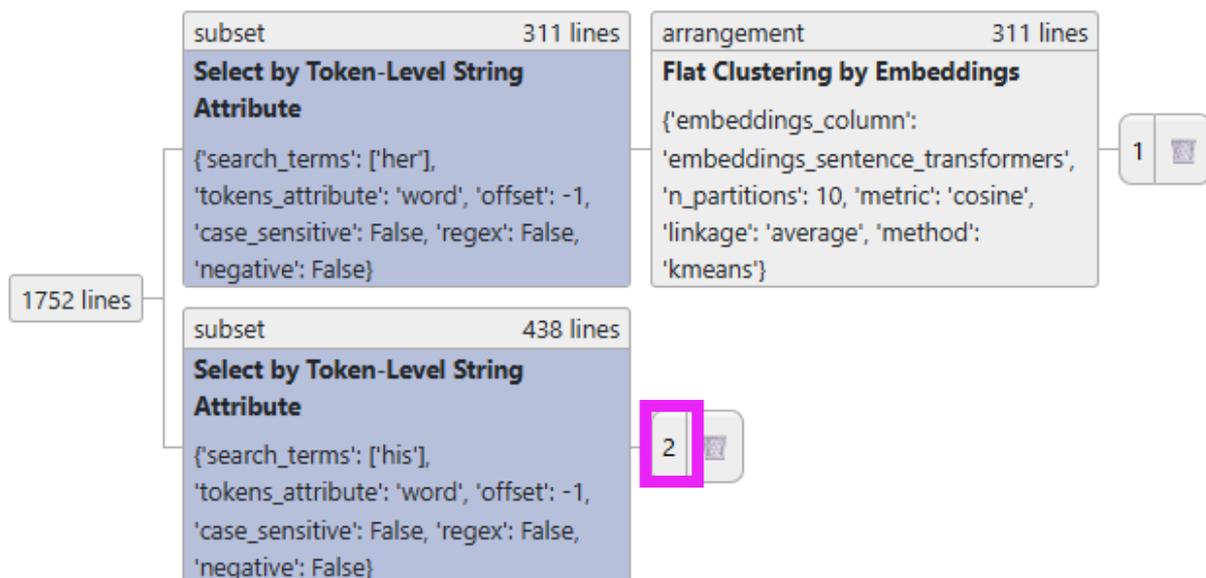
The following steps (in our case, *flat clustering by embeddings*) are not copied over from the 'old' branch. **You can always go back to your previous branch** by clicking **1** next to the tree symbol.

3. In the newly-created **branch 2**, **change the value to match against to his**.  
On running this change, our branches will contain different selections of the overall concordance (*her cheeks / neck ... vs. his cheeks/neck ...*).
4. **Click on the tree symbol** to see a visualization of the entire analysis



In the tree, you can click on any current branch to switch back to the analysis.

5. **click on 2** to go back to the branch that you just created (containing lines with *his* to the left of the node).



## Activity 6: Clustering the new results

In this step, we add a clustering step to our new branch 2. This will allow us to identify groups in the use of *his hands* in the same way we did for *her hands*.

1. Add the **Flat clustering by embeddings algorithm** to branch 2.
2. **Cluster the lines** into 10 partitions.

Since the similarity scores based on sentence embeddings were calculated for the entire concordance, you **don't need to add a new annotation layer!** – Remember: *annotation* is not the same as an *algorithm*.

	Partition	hands	Cluster_0
a parting kick. ¶ "Nice boy, Tommy," said East, shoving	his	hands	in his pockets, and strolling to the fire. ¶ "Worst sort
would be very kind of you." ¶ Mr. Peasemash put	his	hands	in his pockets and laughed, and they did not like
out your pockets," said the constable. ¶ Cyril desperately plunged	his	hands	in his pockets, stood still a moment, and then began
fight, when, to every one's amazement, Oliver coolly put	his	hands	back into his pockets, and walking up to Loman said
a melancholy upon the boy, for, slowly strolling with	his	hands	in his pockets, he crooned:—"Oh, Paddy dear, and did
straw hat at the back of his head, and	his	hands	in his pockets, was staring at workmen as they moved
jape with 'em. Shut up a bit!" ¶ He drove	his	hands	into his pockets and stared out of window at the
All the time that Laura spoke, Frank stood, with	his	hands	in his pockets, where he seemed evidently searching for something
dogs," so his Lordship knitted his brows, and thrust	his	hands	into his waistcoat pockets, walking up and down the room
At this moment the Unicorn sauntered by them, with	his	hands	in his pockets. 'I had the best of it this
Museum steps except the nice one. He stood with	his	hands	in his pockets just as though he was quite used
so sad before. The governor had stood with both	his	hands	in his pockets; now he took his handkerchief out of
better success. During all these trials Peterkin sat with	his	hands	in his pockets, gazing with a most melancholy visage at
broken biscuit and a can of water. Then, thrusting	his	hands	into his pockets, he walked up and down the deck
Alan had stopped opposite to me, his hat cocked,	his	hands	in his breeches pockets, his head a little on one
offer to touch either of them. He glanced at	his	hands,	and Oliver did the same; but they both shook their
he could make nothing of it. So he put	his	hands	in his pockets, and went in to have his tea
been standing just inside one of the stable-doors, with	his	hands	in his pockets, and had heard and seen all that
with sitting. And first of all he strolled with	his	hands	in his pockets up to the crossing, where the girl
right," said Bobbie. ¶ "All the same," said Peter, with	his	hands	in his pockets, "I don't exactly look forward to telling
they were washing in the cold river," said Peter,	his	hands	in his pockets, "not in hot water." ¶ "This is a
bie, indignantly. ¶ "Nyang, nyang!" said Peter, disagreeably, and put	his	hands	in his pockets. ¶ "He did, of course," said Phyllis, in
Hugh John lounged along through the early dusk with	his	hands	in his pockets, looking out for a cause of offence

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## Activity 7: Saving and sharing your research with the analysis tree

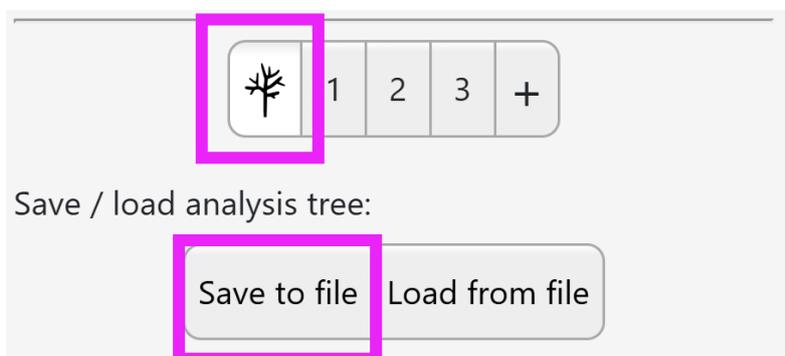
### Background:

We introduced the analysis tree in Activity 5. We now want to show more of what this feature can do for you:

- 1) An analysis can result in a large number of branches and algorithms. To gain an overview of these, you can look at the analysis tree. so it is helpful to see an overview of all steps.
- 2) The analysis may take longer than one session. Using the tree, you can save your work and pick up where you started.
- 3) We might want to share our steps with a colleague or in a publication.

To support reasons 2 and 3 given above, trees can be saved and loaded. This is done by exporting the tree to a JSON file, which you can store on your computer.

1. Go back to the **analysis tree** view
2. **Click on save to file.**
3. Name your tree **rc21\_cl2025\_example.json**
4. Save it in a location where you'll be able to find it again!



## Part 2: interpretation

In this part, we'll take a closer look at selected concordance views from the steps that you just applied to focus more on what they tell us about the use of 'hands'. We will also try out some additional options to see how they affect the results. Don't worry if you don't make it through all steps – if you **save your analysis tree to a file**, you can load it back up anytime to recover your steps!

### Activity 1: clusters for *her* + hands

1. Go to **branch 1** of your analysis tree. To access it, you can load the JSON file for the tree that we just created to get there. If that doesn't work, use this [link](#).
2. By default, the overview shows you the concordance lines in cluster\_0, which is the first partition.
3. **Click on the partition label** for a given cluster to **collapse** and **un-collapse** the lines.

Partition	hands	Cluster_0
		in the towns of Norway. ¶ "Oh, dear!" she cried, dropping her hands from before her glowing face. ¶ "Looked out, think
		at her words; and as she spoke she moved her hands as though to emphasize what she said; while all the
		hoarse laugh rang through the banqueting hall. Matilda put her hands to her head. ¶ "Oh, dear!" she cried, "I feel so
		slap me, I would--" she covered her face with her hands and shuddered. ¶ "What would you do?" Matilda anxiously inquired, as
		am sure I wish that--_that_island----" ¶ Selina placed her hands before Matilda's mouth. "Hush, hush, Matilda, don't say it. You
		you will begin to hate me now!" ¶ Leila removed her hands from her face, and hastily brushed away her tears; then
		see it--she was now covering her eyes with her hands. ¶ Lydia jumped up on the chair and took down the
		heart, and He shall direct thy path." She removed her hands, she looked up, and in a firm voice she said
		could not stand it, she covered her face with her hands. ¶ Selina spoke aside for a few minutes to Dame Burton
		glance she threw at Miss Forest. Annie stood with her hands clasped, and a little frown of perplexity between her brows
		again covered her face, and bowed her head over her hands. She did not speak for a moment, but presently Mr
		me. I must to the kitchen," said Christina, crossing her hands over her breast, to still her trembling heart, for she
		and apple-checked, entered with a bowl of cream in her hands. McTurk kissed her. Beetle followed suit, with exemplary calm. Both
		I'll tell you what it is," said Amy folding her hands, and standing with her face raised, 'it won't do now
		began to speak at once, but Dora put up her hands to her ears and said-- ¶ "One at a time, please
		fur coat and a lot of yellow flowers in her hands. She stopped to speak to me, and asked me how
		Meta, and bring my things. R. M." ¶ Ethel put her hands to her forehead. It was as if she had been
		to be hurt whenever Mary was taken out of her hands; and she went to announce the design, in dread lest
		But why don't you scream now? Alice asked, holding her hands ready to put over her ears again. ¶ "Why, I've done
Node		
Partition	hands	Cluster_0
Partition	hands	Cluster_1
Partition	hands	Cluster_2
Partition	hands	Cluster_3
Partition	hands	Cluster_4
Partition	hands	Cluster_5
Partition	hands	Cluster_6
Partition	hands	Cluster_7
Partition	hands	Cluster_8
Partition	hands	Cluster_9

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### Look at the concordances for some of the clusters

1. What are the differences between **clusters 2 and 5**?
2. How would you describe these similarities compared to patterns that you might identify through other means such sorting?
3. Change the number of clusters to a) 5 and b) to 15. What changes do you see? Which number of clusters seems to work best in term of seeing similarities across concordance lines

## Activity 2: clusters for *his* + *hands*

Go to **branch 2** of your analysis tree ([link](#)) to find the clusters for *his* + *hands*.

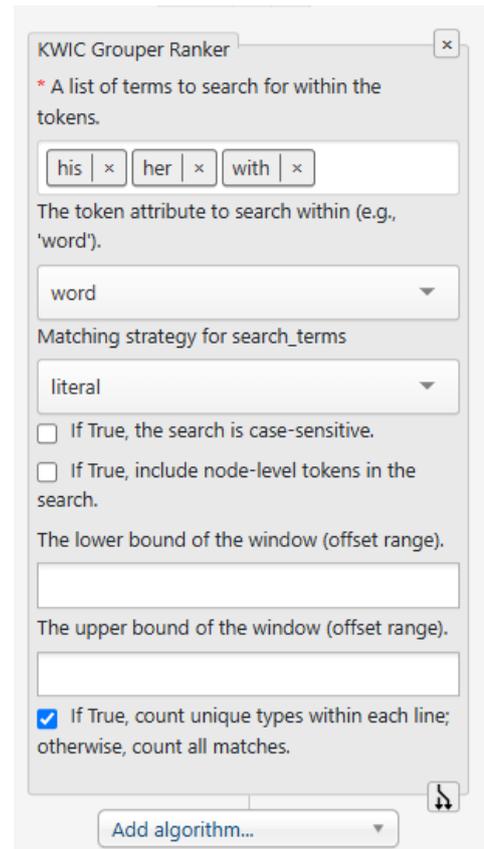
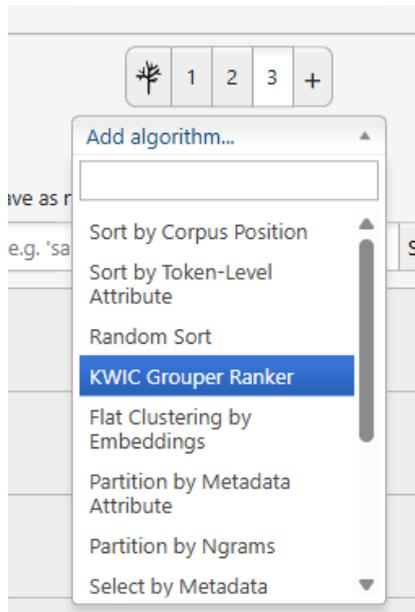
1. How do the uses of **hands in cluster 0** compare to what you saw for *her hands*?

## Activity 3: KWICGroups for *hands*

### Background:

In this activity we will use the KWICGrouper. In CLiC, the KWICGrouper offers the analyst an option to select words in a specified context around the node and group lines together that contain these words. CLiC then displays those lines at the top that contain most of the selected context words. In FlexiConc we have a KWICGrouper option that allows you to rank concordance lines based on type or token frequency. We also support regular expressions to make the search more flexible.

1. Create a new **branch 3** in your analysis tree and find the KWICGrouper Ranker. Enter the values *his*, *her* and *with*.  
If this takes you too much time, use the [link](#) to take you to the concordance lines.



Your results should look like this:

ID	Left	Node	Right	Book	In bk.	Ranking: KWIC Grouper Ranker
303	to ask her to do, and with her nice cool	hands	she tied his tie for him, while the children stood	pan		3
355	her, and next, taking the golden snake with both her	hands,	she bent the pure soft metal round his neck, and	quatermain		3
366	work-table, while Hugh was placed before her, with his	hands	behind his back, and desired to look his mother full	crofton		3
367	way between her and her visitor. He stood, with his	hands	still behind his back, gazing up at Mr Tooke, with	crofton		
528	rs, and while her husband, with smutted face and black	hands,	was filing his locks in his attic, how little did	peasant		
747	start up and spring to her side. She stood with	hands	clasped, and wondering eyes. The pilgrim—his hat on	tdove		
811	seen her coming he could have caught her with his	hands.	¶ She only went a short way down the hedge, and	woodmagic		
900	herself in with him in the dark, where, with her	hands	in his long silky curls, and sitting on the ground	redclyffe		
1008	s asseveration, and her father covered his face with his	hands	in thanksgiving. ¶ After this, he seemed somewhat inclin	daisy		

This handout builds on work funded by the “Reading Concordances in the 21st Century” research project supported by the Arts and Humanities Research Council (AHRC) (grant references: AH/X002047/1 & AH/X002047/2) and the Deutsche Forschungsgemeinschaft (DFG) (grant reference: 508235423). Reading concordances with algorithms: using FlexiConc for children’s literature in CLiC © 2025 by Nathan Dykes, Stephanie Evert, Michaela Mahlberg, Alexander Piperski is licensed under [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/)



2. What kinds of features are highlighted through this use of the KWICGrouper ? Do you see functional similarities between highly-ranked lines?

## Part 3: Recap questions

1. Were there any findings about body language that surprised you?
2. How might you continue this analysis?
3. What were your main learnings from this session?

To cite our work:

Dykes, Nathan; Evert, Stephanie; Mahlberg, Michaela; Piperski, Alexander (2025) Reading concordances with algorithms: using FlexiConc for children's literature in CLiC. Friedrich-Alexander-Universität Erlangen-Nürnberg.

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