

# The Cognitive Characteristics Ontology 0.2

Namespace Document 26 September 2010

## This version:

<http://purl.org/ontology/cco/20100926/cognitivecharacteristics.html>  
(OWL, N3)

## Latest version:

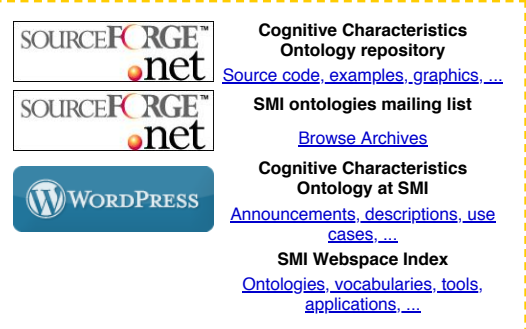
<http://purl.org/ontology/cco/core#> (OWL, N3)

## Previous version:

<http://purl.org/ontology/cco/20100916/cognitivecharacteristics.html>  
(OWL, N3)

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## Abstract

The *Cognitive Characteristics Ontology* specification provides a vocabulary for describing *cognitive pattern* within contexts, their temporal dynamics and their origins, on/ for the Semantic Web. This document contains a RDFa description of the *Cognitive Characteristics Ontology* and some additional information and examples.

## Status of This Document

The *Cognitive Characteristics Ontology* is built on top of the [Weighted Interests Vocabulary v0.5](#) and should probably substitute this ontology in the near future. That means all concepts and properties are imported from this ontology. Some of them are also redefined and renamed to broaden their meaning. Furthermore, the *Cognitive Characteristics Ontology* is inspired by the [Unified User Context Model](#), the [General User Model Ontology](#), the [User Modelling for Information Retrieval Language](#) and all their fundamental sources, and finally, the discussions on the [FOAF developers mailing list](#).

The [Weighted Interests Vocabulary v0.5](#) is an union of the [Weighted Interest Vocabulary](#), the [E-foaf:interest Vocabulary](#) and the [Interest Mining Ontology](#). That means, all interest related ontologies are now merged under one hood and some concepts are proper modeled now. The design of this interest ontology is also strongly influenced by the outcome of the [User \(weighted\) Interests Ontology working\\_group](#) from [Hypios VoCamp Paris 2010](#).

The template of this specification is derived from the [FOAF Vocabulary Specification](#), which was created by [Dan Brickley](#) and [Libby Miller](#), and the [Music Ontology Specification](#), which was created by [Yves Raimond](#). It was modified and extended by Bob Ferris. Furthermore, a modified and extended version of [Danbri's SpecGen version](#) was used to generate most of the RDFa statements of the *Cognitive Characteristics Ontology* for this specification (see [here](#) for SpecGen version 6 by Bob Ferris).

This document is created by combining the [RDFS/OWL](#) machine-readable *Cognitive Characteristics Ontology* with a human-readable *HTML* representation that includes RDFa annotations. Future versions may incorporate *multilingual translations* of term definitions. The RDF/XML version of the specification is also available directly from the namespace URI. RDF/N3 representations could be access via the links above.

The authors welcome comments on this document, preferably via the author's email addresses.

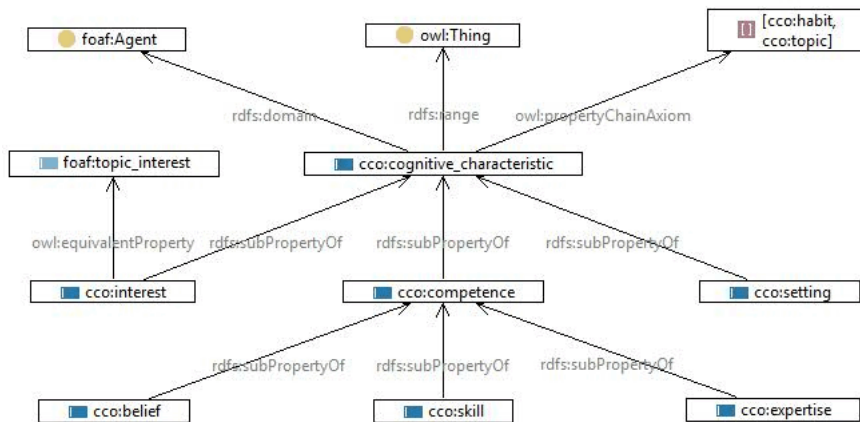
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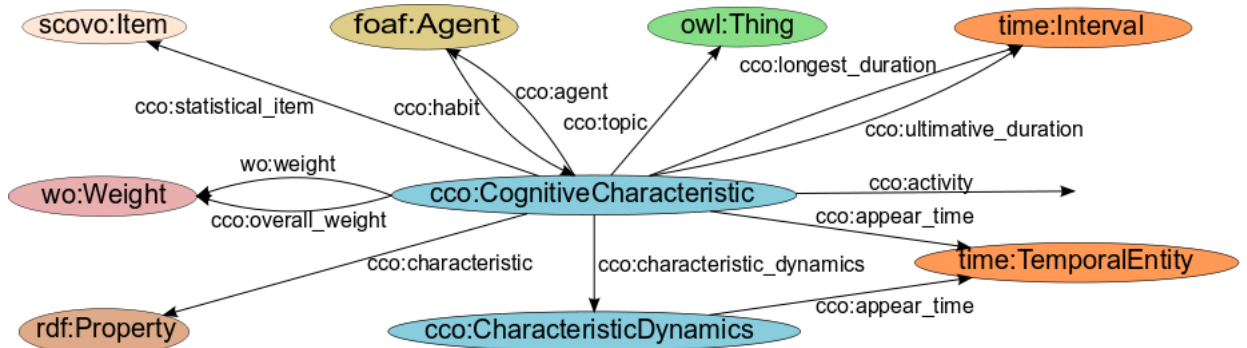
- [The Cognitive Characteristics Ontology cross-reference: Listing the Cognitive Characteristics Ontology Classes, Properties and Individuals](#)
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### The Cognitive Characteristics Ontology at a glance

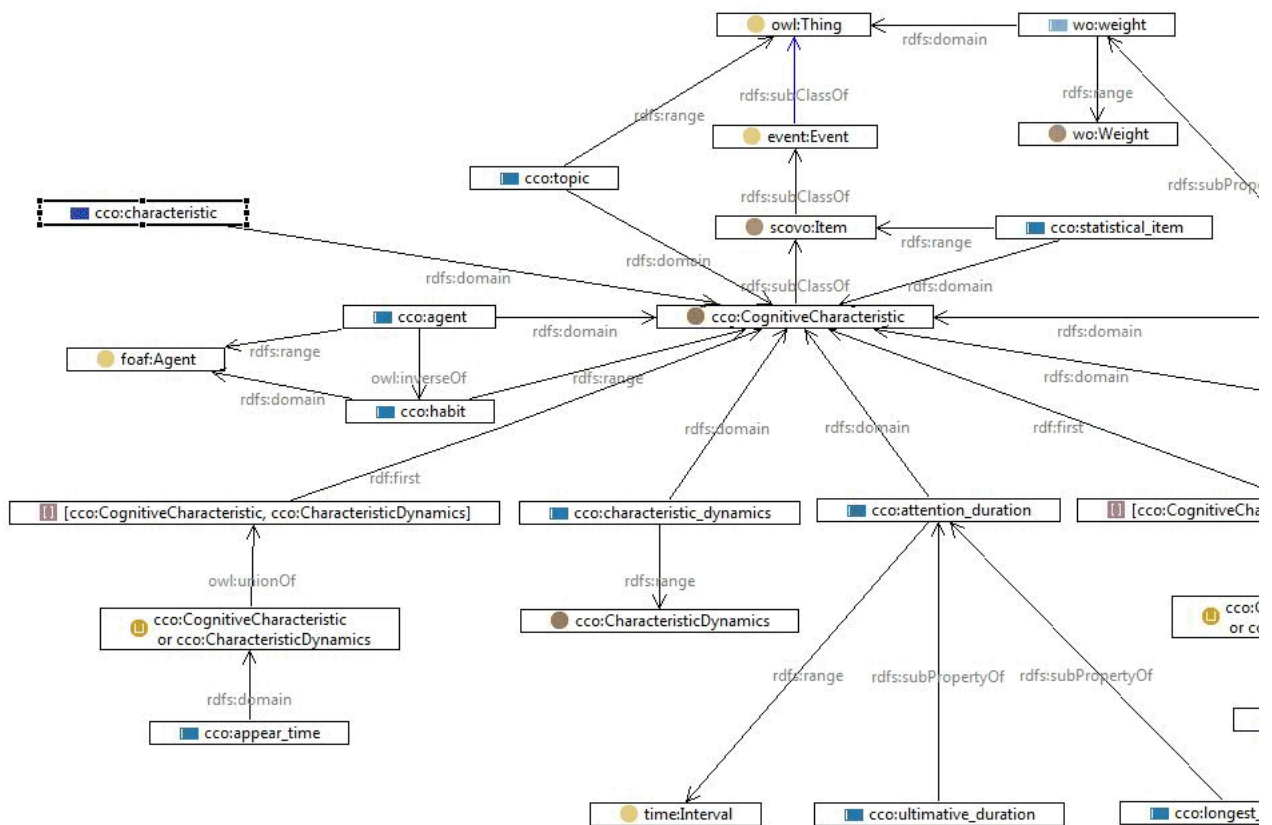
The *cco:cognitive\_characteristic* property as graph with relations:



The *cco:CognitiveCharacteristic* concept as simplified graph with relations:



The *cco:CognitiveCharacteristic* concept as graph with relations:



An a-z index of *Cognitive Characteristics Ontology* terms, by class (categories or types), by property and by individual.

Classes: | [CharacteristicDynamics](#) | [CognitiveCharacteristic](#) |

Properties: | [activity](#) | [agent](#) | [appear\\_time](#) | [attention\\_duration](#) | [belief](#) | [characteristic\\_characteristic\\_dynamics](#) | [cognitive\\_characteristic](#) | [competence](#) | [evidence](#) | [expertise](#) | [habit](#) | [interest](#) | [longest\\_duration](#) | [not\\_interested\\_in](#) | [overall\\_weight](#) | [setting](#) | [skill](#) | [statistical\\_item](#) | [topic](#) | [ultimate\\_duration](#) |

Individuals: | [ExplicitMining](#) | [ImplicitMining](#) |

## Examples

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### Preferences Example

This example is originally taken from the first draft of the [Weighted Interest Vocabulary](#) and was transformed to conform with the current version of the *Cognitive Characteristics Ontology*.

RDF/Turtle representation of a preferences example with characteristic dynamics modelling created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix cco: <http://purl.org/ontology/cco/core#> .
@prefix wo: <http://purl.org/ontology/wo/core#> .
@prefix days: <http://ontologi.es/days#> .
@prefix tl: <http://perl.org/NET/c4dm/timeline.owl#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix ex: <http://example.org/> .
@prefix event: <http://purl.org/NET/c4dm/event.owl#> .
@prefix geo: <http://www.w3.org/2003/01/geo/wgs84_pos#> .

<http://swordfish.rdfweb.org/people/libby/rdfweb/webwho.xrdf#me>
  a foaf:Person ;
  foaf:name "Libby Miller" ;
  cco:interest <http://www.bbc.co.uk/5live#service> ;
  cco:interest <http://www.bbc.co.uk/radio4#service> ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://www.bbc.co.uk/5live#service> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 3.0 ;
      wo:scale ex:AScale
    ] ;
    cco:characteristic_dynamics ex:Working ;
    cco:activity <http://dbpedia.org/resource/Listening>
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://www.bbc.co.uk/radio4#service> ;
    cco:characteristic cco:interest ;
    cco:overall_weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
    wo:weight [
      a wo:Weight ;
      wo:weight_scale 5.0 ;
      wo:scale ex:AScale
    ] ;
    cco:characteristic_dynamics ex:Working ;
    cco:activity <http://dbpedia.org/resource/Listening>
  ] .

ex:AScale a wo:Scale ;
wo:min_weight 0.0 ;
wo:max_weight 9.0 ;
wo:step_size 1.0 .

ex:Working a cc:CharacteristicDynamics ;
cco:appear_time [
  a days:WeekdayInterval ;
  tl:at "08:00:00"^^xsd:time ;
  tl:end "19:00:00"^^xsd:time
] ;
wo:weight_value 9.0 ;
wo:scale ex:AScale ;
event:place ex:MyWorkingPlace .

ex:MyWorkingPlace a geo:Point .
```

This example shows a part of a preference model of a person (here Libby Miller). It consists of two preferences, each is modeled as a *cco:CognitiveCharacteristic* instance, which are related to the person by using the property *cco:habit*. An interest itself consists here at least of a topic (*cco:topic*), a weight (*wo:weight*)

and an characteristic dynamics description ([cco:characteristic\\_dynamics](#)) relation. Furthermore, in addition to the standard weight relation ([wo:weight](#)), which should reflect the current interest in a topic, the overall interest in a topic, can be related by using the property ([cco:overall\\_weight](#)) with a [cco:CognitiveCharacteristic](#) instance as subject.

The topics of the weights are both a [BBC](#) radio program. Every weight is modeled as a [wo:Weight](#) instance, which consists here of the weight value ([wo:weight\\_value](#)) and a link to a scale description ([wo:scale](#)). A [wo:Scale](#) instance describes the range ([wo:min\\_weight](#) and [wo:max\\_weight](#)) for the groups of weights, which are linked to it, and furthermore, the step size ([wo:step\\_size](#)), which is possible in this range.

[cco:CognitiveCharacteristic](#) instances can have different interest dynamics ([cco:CharacteristicDynamics](#)) relations. These are specific events ([event:Event](#)), which model temporal interest statistics. Besides the already known time period ([days:WeekdayInterval](#)), which is related by the property [cco:appear\\_time](#), a temporal weight (related by [wo:weight\\_value](#), because [cco:CharacteristicDynamics](#) is a sub class of [wo:Weight](#)) and can describe the temporal interest in a topic to a context, which is here additionally described by a spatial relation ([event:place](#)).

To sum up the example, the person Libby Miller prefers radio 4 over radio 5 when he is working at his working place (which is every weekday between 8am and 7pm).

### Not-Interest-In Example

This example is originally taken from the first draft of the [Weighted Interest Vocabulary](#) and was transformed to be conform with the current version of the *Cognitive Characteristics Ontology*.

RDF/Turtle representation of a not-interest-in example created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix cco: <http://purl.org/ontology/cco/core#> .

<http://swordfish.rdfweb.org/people/libby/rdfweb/webwho.xrdf#me>
  a foaf:Person;
  foaf:name "Libby Miller";
  cco:not_interested_in <http://dbpedia.org/resource/The_X_Factor_(UK)> .
```

This example describes a person (here Libby Miller), who is not interested in ([cco:not\\_interest\\_in](#)) a specific topic (here ["The X-Factor"](#)).

### Scientific Research Interests Example

This example is originally taken from the [E-foaf:interest Vocabulary Specification 0.2](#) and was transformed to be conform with the current version of the *Cognitive Characteristics Ontology*.

RDF/Turtle representation of a scientific research interests example created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix tl: <http://purl.org/NET/c4dm/timeline.owl#> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix cco: <http://purl.org/ontology/cco/core#> .
@prefix wo: <http://purl.org/ontology/wo/core#> .
@prefix ex: <http://example.org/> .
@prefix time: <http://www.w3.org/2006/time#> .

ex:ASpecificContext a cco:CharacteristicDynamics ;
  dcterms:subject <http://dblp.uni-trier.de/rec/bibtex/conf/cikm/AlonsoGB09> ;
  cco:appear_time [
    a time:UTInstant ;
    time:inXSDDateTime "2009-11-15T05:30:00+08:00"^^xsd:dateTime
  ] .

<http://linkeddata.uriburner.com/describe/?url=http://tw.rpi.edu/wiki/Special:URIResolver/Ricardo_A._Baeza-2DYates>
  a foaf:Person ;
  foaf:topic_interest <http://dbpedia.org/resource/World_Wide_Web> ;
  cco:habit ex:WebInterest ;
  foaf:name "Ricardo Baeza-Yates" .

ex:WebInterest a cco:CognitiveCharacteristic ;
  cco:topic <http://dbpedia.org/resource/World_Wide_Web> ;
  cco:characteristic cco:interest ;
  cco:overall_weight [
    a wo:Weight ;
    wo:weight_value 65.0 ;
    wo:scale ex:AScale ;
    dcterms:modified "2009-12-22T23:30:00+08:00"^^xsd:dateTime
  ] ;
  cco:characteristic_dynamics ex:ASpecificContext ;
  cco:ultimate_duration [
    a tl:UTInterval ;
    tl:duration "P10Y"^^xsd:duration ;
    dcterms:modified "2010-01-10T03:15:00+08:00"^^xsd:dateTime
  ] ;
  cco:longest_duration [
    a tl:UTInterval ;
    tl:duration "P9Y"^^xsd:duration ;
    dcterms:modified "2010-01-17T05:30:00+08:00"^^xsd:dateTime
  ] ;
  wo:weight [
    a wo:Weight ;
    wo:weight_value 7.81 ;
    wo:scale ex:AnotherScale ;
    dcterms:modified "2010-01-17T13:30:00+08:00"^^xsd:dateTime
  ] .
```

```

ex:AScale a wo:Scale ;
  wo:min_weight 0.0 ;
  wo:max_weight 100 ;
  wo:step_size 5.0 .

ex:AnotherScale a wo:Scale ;
  wo:min_weight 0.0 ;
  wo:max_weight 10.0 ;
  wo:step_size 0.01 .

```

This example describes a person (here Ricardo Baeza-Yates), who is interested in ([foaf:topic\\_interest](#)) a specific topic (here ["The World Wide Web"](#)). This interest is described more in detail with help of a [cco:CognitiveCharacteristic](#) instance (ex:WebInterest). It has a current weight ([wo:weight](#)), a total weight ([cco:overall\\_weight](#)) and two attention durations - a ultimate duration ([cco:ultimate\\_duration](#)) and a longest duration ([cco:longest\\_duration](#)). All these values can be timestamped, e.g. re. their date of modification ([dcterms:modified](#)). A [cco:CognitiveCharacteristic](#) instance (ex:ASpecificContext) describes the appearing of this interest in a certain context (here a [specific\\_paper](#)). To describe the different weightings, different scales can be associated to them.

## Music Preferences Example

RDF/Turtle representation of a music preferences example created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```

@prefix foaf:      <http://xmlns.com/foaf/0.1/> .
@prefix cco:      <http://purl.org/ontology/cco/core#> .
@prefix wo:      <http://purl.org/ontology/wo/core#> .
@prefix days:    <http://ontology.es/days#> .
@prefix tl:      <http://perl.org/NET/c4dm/timeline.owl#> .
@prefix xsd:     <http://www.w3.org/2001/XMLSchema#> .
@prefix ex:      <http://example.org/> .
@prefix event:   <http://purl.org/NET/c4dm/event.owl#> .
@prefix dcterms: <http://purl.org/dc/terms/> .

<http://foaf.me/zazi#me>
  a foaf:Person ;
  foaf:name "Bob Ferris" ;
  cco:interest <http://dbtune.org/musicbrainz/resource/artist/20ff3303-4fe2-4a47-a1b6-291e26aa3438> ;
  cco:interest <http://dbtune.org/musicbrainz/resource/artist/470a4ced-1323-4c91-8fd5-0bb3fb4c932a> ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbtune.org/musicbrainz/resource/artist/20ff3303-4fe2-4a47-a1b6-291e26aa3438> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 3.0 ;
      wo:scale ex:AScale
    ] ;
    cco:appear_time [
      dc:title "working time" ;
      a days:WeekdayInterval ;
      tl:at "08:00:00"^^xsd:time ;
      tl:end "19:00:00"^^xsd:time ;
      dcterms:modified "2009-12-14T10:01:00+01:00"^^xsd:dateTime
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbtune.org/musicbrainz/resource/artist/470a4ced-1323-4c91-8fd5-0bb3fb4c932a> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale ;
      dcterms:modified "2010-06-18T09:34:00+01:00"^^xsd:dateTime
    ] ;
    cco:overall_weight [
      a wo:Weight ;
      wo:weight_value 5.0 ;
      wo:scale ex:AScale ;
      dcterms:modified "2010-07-02T22:20:00+01:00"^^xsd:dateTime
    ] ;
    cco:appear_time [
      dc:title "party time" ;
      a days:FridayInterval ;
      tl:at "23:00:00"^^xsd:time ;
      dcterms:modified "2010-03-21T18:40:00+01:00"^^xsd:dateTime
    ] ;
    cco:characteristic_dynamics ex:TechnoParty ;
    cco:characteristic_dynamics ex:BigFan ;
    cco:ultimate_duration [
      a tl:UTInterval ;
      tl:duration "P13Y"^^xsd:duration ;
      dcterms:modified "2010-08-14T17:25:00+01:00"^^xsd:dateTime
    ] ;
    cco:longest_duration [
      a tl:UTInterval ;
      tl:duration "P5Y"^^xsd:duration ;
      tl:at "2001-02-02T00:00:00+01:00"^^xsd:dateTime ;
      tl:end "2005-10-21T00:00:00+01:00"^^xsd:dateTime ;
      dcterms:modified "2010-08-14T17:25:00+01:00"^^xsd:dateTime
    ] ;
  ] ;
  cco:not_interested_in <http://dbpedia.org/resource/Category:Schlager> ;
  cco:not_interested_in <http://dbpedia.org/resource/Category:German_folk_music> .

ex:AScale a wo:Scale ;
  wo:min_weight 0.0 ;
  wo:max_weight 9.0 ;

```



```

wo:step_size 1.0 .

ex:TechnoParty a cco:CharacteristicDynamics ;
cco:appear_time [
  a tl:TimeInterval ;
  tl:at "2010-04-03T23:30:00+01:00"^^xsd:dateTime ;
  tl:end "2010-04-04T05:30:00+01:00"^^xsd:dateTime
] ;
wo:weight_value 9.0 ;
wo:scale ex:AScale ;
event:place <http://dbpedia.org/resource/Tresor> ;
dcterms:subject <http://www.residentadvisor.net/event.aspx?151690> .

ex:BigFan a cco:CharacteristicDynamics ;
cco:appear_time [
  a tl:TimeInterval ;
  tl:at "2001-02-02T00:00:00+01:00"^^xsd:dateTime ;
  tl:end "2005-10-21T00:00:00+01:00"^^xsd:dateTime
] ;
wo:weight_value 9.0 ;
wo:scale ex:AScale .

```

This example describes a person (here Bob Ferris), who is interested ([cco:interest](#)) in some music artists ([James Brown](#) and [Jeff Mills](#)) and does not like ([cco:not interested in](#)) some music genres ([Schlager](#) and [German Folk Music](#)). Besides, the detailed interests descriptions ([cco:CognitiveCharacteristic](#)) with a characteristic common appear time ([cco:appear time](#)), further characteristic dynamics ([cco:CharacteristicDynamics](#)) with separate weightings are added to them, e.g. a description of a specific Techno party ([ex:TechnoParty](#)), where Jeff Mills played, with a specific [location](#) (related by [event:place](#)), an [event description](#) (related by [dcterms:subject](#)), and a period of time, where Bob was a big fan of him ([ex:BigFan](#)).

### Cognitive Patterns Example

RDF/Turtle representation of a *cognitive patterns* example created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```

@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix cco: <http://purl.org/ontology/cco/core#> .
@prefix wo: <http://purl.org/ontology/wo/core#> .
@prefix ex: <http://example.org/> .

<http://foaf.me/zazi#me>
  a foaf:Person ;
  foaf:name "Bob Ferris" ;
  cco:interest <http://dbpedia.org/resource/Category:Knowledge_representation> ;
  cco:skill <http://dbpedia.org/resource/Category:Ontology_(information_science)> ;
  cco:expertise <http://dbpedia.org/resource/Category:Ontology> ;
  cco:belief <http://dbpedia-live.openlinksw.com/describe/?url=http://dbpedia.org/resource/Named_graph> ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Knowledge_representation> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 9.0 ;
      wo:scale ex:AScale
    ] ;
    cco:characteristic_dynamics [
      a cco:CharacteristicDynamics ;
      dcterms:subject <http://dbpedia.org/resource/Category:Semantic_Web>
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Ontology_(information_science)> ;
    cco:characteristic cco:skill ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
    cco:activity <http://dbpedia.org/resource/Knowledge_engineering>
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Ontology> ;
    cco:characteristic cco:expertise ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 5.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia-live.openlinksw.com/describe/?url=http://dbpedia.org/resource/Named_graph> ;
    cco:characteristic cco:belief ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
  ] .

ex:AScale a wo:Scale ;
wo:min_weight 0.0 ;
wo:max_weight 9.0 ;
wo:step_size 1.0 .

```

This example shows a part of a *cognitive pattern* model of a person (here Bob Ferris). It consists of an example for each specific competence (*cco:competence*) property (*cco:skill*, *cco:expertise* and *cco:belief*) and an interest (*cco:interest*). Each topic of the interest, skill and expertise is a specific *DBPedia* category. The topic of the belief is represented by a *DBPedia Live* entry. Based on the *SKOS* organized taxonomy of the *DBPedia* categories, one can infer their contexts and will realized that all mentioned topics etc. are somehow related to each other.

At first, an upper category of *dbpedia-cat:Semantic\_Web* and *dbpedia-cat:Ontology\_(information\_science)* is *dbpedia-cat:Knowledge\_representation*, which is related by the property *skos:broader*. However, a further upper category of *dbpedia-cat:Ontology\_(information\_science)* is *dbpedia-cat:Ontology*. Finally, the entry *dbpedia-live:Named\_graph* is tagged with *dbpedia-cat:Semantic\_Web* and the entry *dbpedia:Knowledge\_engineering* is tagged with *dbpedia-cat:Ontology\_(information\_science)*.

So these relations can illustrate a coherence of *cognitive patterns* of a person. Thereby, the modelling of the cognitive characteristics descriptions (*cco:CognitiveCharacteristic* instances) of a person, especially weightings and characteristic dynamics can be described in the same manner. To summarize the description above one can say: Bob Ferris is interested in *Knowledge Representation*, has some expertise in *Ontologies*, some skills in handling (*Knowledge Engineering*) *Ontologies in the topic of Information Science* and a certain belief in the *Named Graphs* approach.

## UMIRL Example

This example was originally modelled with help of [UMIRL](#) and is now recreated with the *Cognitive Characteristics Ontology*.

RDF/Turtle representation of a part of an user profile example created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```

@prefix foaf:      <http://xmlns.com/foaf/0.1/> .
@prefix cco:      <http://purl.org/ontology/cco/core#> .
@prefix wo:      <http://purl.org/ontology/wo/core#> .
@prefix days:    <http://ontologi.es/days#> .
@prefix tl:      <http://perl.org/NET/c4dm/timeline.owl#> .
@prefix xsd:     <http://www.w3.org/2001/XMLSchema#> .
@prefix ex:      <http://example.org/> .
@prefix rdf:     <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs:    <http://www.w3.org/2000/01/rdf-schema#> .
@prefix owl:   <http://www.w3.org/2002/07/owl#> .
@prefix dc:      <http://purl.org/dc/elements/1.1/> .
@prefix cv:      <http://kaste.lv/~captsolo/semweb/resume/cv.rdfs#> .
@prefix cvbase:  <http://kaste.lv/~captsolo/semweb/resume/base.rdfs#> .
@prefix countries: <http://www.daml.org/2001/09/countries/countries.daml#> .
@prefix sim:     <http://purl.org/ontology/similarity/> .
@prefix ao:      <http://purl.org/ontology/ao/core#> .

ex:APerson
  a foaf:Person , cv:Person ;
  foaf:name "John White" ;
  foaf:birthday "1974-07-09"^^xsd:date ;
  foaf:gender "male" ;
  cv:hasCitizenship countries:US ;
  cco:skill <http://dbpedia.org/resource/Piano> ;
  cco:skill <http://dbpedia.org/resource/Vocal> ;
  cco:expertise <http://dbpedia.org/resource/Music> ;
  cco:interest <http://dbpedia.org/resource/Category:Classical_music> ;
  cco:interest <http://dbpedia.org/resource/Category:Blues> ;
  cco:interest <http://dbpedia.org/resource/Category:Pop_music> ;
  cco:interest <http://dbpedia.org/resource/Category:Rock_music> ;
  cco:interest <http://dbpedia.org/resource/Wolfgang_Amadeus_Mozart> ;
  cco:interest <http://dbpedia.org/resource/The_Beatles> ;
  cco:interest <http://dbtune.org/musicbrainz/resource/signal/8aefa373-2858-4643-b691-cad4ac7c971a> ;
  cco:interest ex:IdiosyncraticGenre1 ;
  cco:interest ex:IdiosyncraticGenre2 ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Piano> ;
    cco:characteristic cco:skill ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 6.0 ;
      wo:scale ex:AScale
    ] ;
    cco:activity <http://sw.opencyc.org/concept/Mx4rvVjUJ5wpEbGdrcN5Y29ycA>
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Vocal> ;
    cco:characteristic cco:skill ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
    cco:activity <http://dbpedia.org/resource/Category:Singing>
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Music> ;
    cco:characteristic cco:expertise ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 0.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Classical_music> ;

```

```

    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Blues> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 9.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Pop_music> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 5.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Category:Rock_music> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 8.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic ex:IdiosyncraticGenre2 ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
    cco:appear_time [
      a days:WeekdayInterval ;
      dc:title "bedtime" ;
      tl:at "23:00:00"^^xsd:time
    ] ;
  ] .

ex:ACV
  a cv:CV ;
  cv:aboutPerson ex:APerson ;
  cv:hasEducation [
    a cv:Education ;
    cv:degreeType cvbase:EduMaster
  ] ;
  cv:hasWorkHistory ex:AWorkHistory .

ex:AWorkHistory
  a cv:WorkHistory ;
  cv:careerLevel cvbase:Student .

ex:tempo
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:range xsd:string ;
  rdfs:subPropertyOf ao:context .

ex:IdiosyncraticGenre1
  a sim:Association ;
  dc:title "happy music" ;
  ao:genre <http://dbpedia.org/resource/Category:Pop_music> ;
  ex:tempo "allegro" ;
  ao:mood "happy" .

ex:IdiosyncraticGenre2
  a sim:Association ;
  dc:title "romantic music" ;
  ex:tempo "largo" .

ex:AScale a wo:Scale ;
  wo:min_weight 0.0 ;
  wo:max_weight 9.0 ;
  wo:step_size 1.0 .

```

This example shows a part of a user profile as it can be taken from an user account of a *personal music knowledge base*. The user profile is from the person John White, who can [play](#) the [piano](#) and [sing](#) by having no education in [music](#). Furthermore, he is interested in several music genres, the music artist [Wolfgang Amadeus Mozart](#), the music group the [Beatles](#), the music song "[Yesterday](#)" from the [Beatles](#) and some self-defined idiosyncratic music genres.

At the beginning, all *cognitive patterns* of this user are described by simple semantic relations, which are sub properties of [cco:cognitive characteristic](#). Thereby, the most of the topics of the cognitive characteristic relations are information resources from the information service [DBPedia](#) and one topic is a information resource from [DBTune](#). Afterwards, some of these *shortcut relations* are described more in detail with help of [cco:CognitiveCharacteristic](#) instances.

Each of these cognitive characteristic descriptions is related to a weighting with a different weight value (related by [wo:weight value](#)) and the same scale (related by [wo:scale](#)). Due to these weightings, we can



conclude that John White can [sing](#) and [play](#) the [piano](#) quite good. However, he has no knowledge in [musical foundations](#). Furthermore, a [cco:CognitiveCharacteristic](#) instance is associated with a topic (by [cco:topic](#)) of a *shortcut relation* and a property (by [cco:characteristic](#)) of such a relation. Besides these information some of them are also related with an activity (associated by [cco:activity](#)), which are information resources from [OpenCyc \(playing a musical instrument\)](#) or [DBPedia \(singing\)](#).

This user profile example includes especially detailed descriptions of John White's interest in specific music genres. Thereby, we can conclude (besides other things) that he is a big fan of [Blues](#) and [Rock](#) music and quite interested in romantic music (*ex:IdiosyncraticGenre2*). The last music genre is defined as *music context*, which he prefers weekdays (represented by [days:WeekdayInterval](#)) at "bedtime" (ca. 11 pm). This idiosyncratic genre is itself defined as a [sim:Association](#) instance, which is titled as "romantic music" and should be very slow ([largo](#), associated by *ex:tempo* as sub property of [ao:context](#)).

## Soccer Example

RDF/Turtle representation of a part of an user profile example with different cognitive characteristics of the same topic created with the *Cognitive Characteristics Ontology* (see also [RDF](#) and [N3](#) for downloadable representations of this example):

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix cco: <http://purl.org/ontology/cco/core#> .
@prefix wo: <http://purl.org/ontology/wo/core#> .
@prefix ex: <http://example.org/> .

ex:APerson
  a foaf:Person ;
  foaf:name "John Wayne" ;
  cco:skill <http://dbpedia.org/resource/Football_(soccer)> ;
  cco:expertise <http://dbpedia.org/resource/Football_(soccer)> ;
  cco:interest <http://dbpedia.org/resource/Football_(soccer)> ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Football_(soccer)> ;
    cco:characteristic cco:skill ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 6.0 ;
      wo:scale ex:AScale
    ] ;
    cco:activity <http://sw.opencyc.org/concept/Mx4rwJriEpwEbGdrcN5Y29ycA>
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Football_(soccer)> ;
    cco:characteristic cco:expertise ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 7.0 ;
      wo:scale ex:AScale
    ] ;
  ] ;
  cco:habit [
    a cco:CognitiveCharacteristic ;
    cco:topic <http://dbpedia.org/resource/Football_(soccer)> ;
    cco:characteristic cco:interest ;
    wo:weight [
      a wo:Weight ;
      wo:weight_value 5.0 ;
      wo:scale ex:AScale
    ] ;
    cco:activity <http://sw.opencyc.org/concept/Mx4rw00J55wpEbGdrcN5Y29ycA>
  ] .

ex:AScale a wo:Scale ;
wo:min_weight 0.0 ;
wo:max_weight 9.0 ;
wo:step_size 1.0 .
```

This user profile example above, with different cognitive characteristics of the same topic, represents the person John Wayne, who has three different *cognitive patterns* - a skill ([cco:skill](#)), an expertise ([cco:expertise](#)) and an interest ([cco:interest](#)) - with the topic [soccer](#). At the beginning, each semantic relation is modelled as *shortcut relation*. Afterwards, follow more detailed descriptions of these three cognitive characteristics, which are associated to John Wayne by using the property [cco:habit](#). Each of these [cco:CognitiveCharacteristic](#) instances include, besides the basis information of the *shortcut relations*, also a weight description and two of them, furthermore, an activity relation (associated by [cco:activity](#)).

So that a reasoning engine is now not only able to automatically infer the knowledge from the *shortcut relations* now, but rather then also from the *reification class* instances. That means, one can conclude that John Wayne

- can [play soccer](#) quite moderate,
- has a quite good knowledge about the topic [soccer](#) and
- and is moderately interested in [watching soccer](#).

Such a modelling has the advantage that one can talk about one and the same topic, independently of the activities that are related to *cognitive pattern* descriptions of a person. This is possible, because activity, cognitive characteristic and topic have their own, separate dimension.

Due to the *property reification* definitions from [here](#) and the *shortcut relation* and *property reification* rules of the [Property Reification Vocabulary](#) (see [here](#)) one can clearly reason that the *shortcut relations* and *reification class* instances in the soccer example above are belonging semantically together (here pairwise).

## Introduction: Cognitive Characteristics Ontology Basics

### What's the Cognitive Characteristics Ontology for?

The *Cognitive Characteristics Ontology* includes two opportunities to model *cognitive patterns*. The first one is the representation of cognitive characteristics by using the semantic relation [cco:cognitive\\_characteristic](#) or better its more specialised sub properties (see graphic [cco:cognitive\\_characteristic\\_property\\_as\\_graph\\_with\\_relations](#)) to associate the topics of the *cognitive patterns* to the users. The second opportunity is the *property-oriented context reification* of [cco:cognitive\\_characteristic](#), [cco:CognitiveCharacteristic](#), which is a general multiple purpose cognitive characteristic concept to describe *cognitive patterns* more in detail for a specific user or user group.

As one can see in graphic [cco:CognitiveCharacteristic concept as graph with relations](#), the specialised sub properties of [cco:cognitive\\_characteristic](#), the *cognitive patterns*, currently are

- interest ([cco:interest](#)), that means, a certain area of interest or preference, which is equivalent to [foaf:topic\\_interest](#).
- competence ([cco:competence](#)), that means, the competence to (be able to) do or know something or
- setting ([cco:setting](#)), often regarding a specific environment, e.g. an application.

One can also refine the semantic relation of a competence association by using the sub properties of [cco:competence](#), which are currently:

- [cco:skill](#): the ability or skill to (be able to) do something, e.g. to walk, to play the piano or to work in a team
- [cco:expertise](#): the knowledge or expertise in a certain domain or a specific topic, e.g. football, programming languages or music
- [cco:belief](#): an uncertain relation for competence representation, that means beliefs, persuasions or opinions, which can also be misconceptions

One can see the second opportunity to model *cognitive patterns*, [cco:CognitiveCharacteristic](#) in graphic [cco:CognitiveCharacteristic concept as simplified graph with relations](#). This concept can be used to associate any [foaf:Agent](#) instance to (a) [cco:CognitiveCharacteristic](#) instance(s) with help of the properties [cco:habit](#) and [cco:agent](#). The topics of a [cco:CognitiveCharacteristic](#) instance are related to it by using the property [cco:topic](#), so that a property chain of [cco:habit](#) and [cco:topic](#) will also direct to topics of a *cognitive pattern* of an user or user group. That means, a statement that is modelled with the simple semantic relation approach based on [cco:cognitive\\_characteristic](#) can also be represented by an instance of [cco:CognitiveCharacteristic](#), which has a [cco:agent](#) or [cco:habit](#), a [cco:topic](#) and a [cco:characteristic](#) relation. The last property in this row is used to associate the applied *cognitive pattern* relation (sub properties of [cco:cognitive\\_characteristic](#)).

Different statistics can be made on cognitive characteristics. These are currently:

- [cco:overall\\_weight](#), which reflects the overall interest in a topic and should be different from the actual weight (associated by the property [wo:weight](#)) of a cognitive characteristic
- [cco:longest\\_duration](#), which is the longest continuous interval of attention for a *cognitive pattern*, e.g. for an interest, if it appears in the following years: 1990, 1991, 1995, 1996, 1997, 1998, 2001, then the longest duration is 4 years
- [cco:ultimate\\_duration](#), which is the overall duration of attention for a *cognitive pattern*, e.g. for an interest, if it appears in the following years: 1990, 1991, 1995, 1996, 1997, 1998, 2001, then the longest duration is 7 years

Besides these statistics, one can also associate a concrete activity (by using the property [cco:activity](#)), to differentiate e.g. between football playing (topic = football; activity = playing) and football watching (topic = football; activity = watching), and further statistical items (by using the property [cco:statistical\\_item](#)) to a *cognitive pattern* description, which is itself also a sub class of [scovo:item](#).

It is also important, to be able to describe dynamics of a cognitive characteristic. In the *Cognitive Characteristics Ontology* they can be described with help of the [cco:CharacteristicDynamics](#) concept, which is a sub class of [wo:Weight](#), and can be related to a [cco:CognitiveCharacteristic](#) instance by using the property [cco:characteristic\\_dynamics](#). Thereby, one can relate

- concrete appear times (time instants or intervals, by using the property [cco:appear\\_time](#)), when a *cognitive pattern* gets attention by someone, or
- an evidence description (by using the property [cco:evidence](#)), where this characteristic or dynamics was derived from.

to a [cco:CognitiveCharacteristic](#) or [cco:characteristic\\_dynamics](#) instance.

Due to the two modelling opportunities of *cognitive pattern* in the *Cognitive Characteristics Ontology*, there is a need for formal semantics to associate statements with a *shortcut relation* and instances of the reification class that belonging together or to infer such knowledge with a reasoning engine. The [Property Reification Vocabulary](#) fulfil these requirements. The *property reification* definitions for the *Cognitive Characteristics Ontology* are available via the namespace URI `'http://purl.org/ontology/cco/mappings#'`. There is for each cognitive pattern property one *propety reification* definition (see [Cognitive Characteristics Ontology - Property Reification Mappings](#)).

## Background

TODO

## The Cognitive Characteristics Ontology and Standards

TODO

TODO

## The Cognitive Characteristics Ontology Description

This specification serves as the *Cognitive Characteristics Ontology* "namespace document". As such it describes the *Cognitive Characteristics Ontology* and the terms ([RDF](#) classes and properties) that constitute it, so that [Semantic Web](#) applications can use those terms in a variety of [RDF-compatible](#) document formats and applications.

This document presents the *Cognitive Characteristics Ontology* as a [Semantic Web](#) vocabulary or *Ontology*. The *Cognitive Characteristics Ontology* is pretty simple, pragmatic and designed to allow simultaneous

deployment and extension. The *Cognitive Characteristics Ontology* is intended for widescale use, but its authors make no commitments regarding its suitability for any particular purpose.

## Evolution and Extension of the Cognitive Characteristics Ontology

The *Cognitive Characteristics Ontology* is identified by the namespace URI `http://purl.org/ontology/cco/core#`. Revisions and extensions of the *Cognitive Characteristics Ontology* are conducted through edits to this document, which by convention is accessible in the Web via the namespace URI. For practical and deployment reasons, note that **we do not update the namespace URI as the vocabulary matures**.

The evolution of the *Cognitive Characteristics Ontology* is best considered in terms of the stability of individual vocabulary terms, rather than the specification as a whole. As terms stabilise in usage and documentation, they progress through the categories 'unstable', 'testing' and 'stable'. Older terms are marked 'archaic' which allows the possibility of older forms to become modern again.

## The Cognitive Characteristics Ontology cross-reference: Listing the Cognitive Characteristics Ontology Classes, Properties and Individuals

The *Cognitive Characteristics Ontology* introduces the following classes, properties and individuals. There is a link at the top of this document to the RDF/XML and RDF/N3 versions.

Classes: | [CharacteristicDynamics](#) | [CognitiveCharacteristic](#) |

Properties: | [activity](#) | [agent](#) | [appear\\_time](#) | [attention\\_duration](#) | [belief](#) | [characteristic](#) | [characteristic\\_dynamics](#) | [cognitive\\_characteristic](#) | [competence](#) | [evidence](#) | [expertise](#) | [habit](#) | [interest](#) | [longest\\_duration](#) | [not\\_interested\\_in](#) | [overall\\_weight](#) | [setting](#) | [skill](#) | [statistical\\_item](#) | [topic](#) | [ultimate\\_duration](#) |

Individuals: | [ExplicitMining](#) | [ImplicitMining](#) |

Classes, Properties and Individuals (full detail)

### Classes

Class: `cco:CharacteristicDynamics`

*Characteristic Dynamics* - An event concept for describing dynamics of characteristics, e.g. weight changes, periods of interest.

**Status:** testing

**Used with:** [characteristic\\_dynamics](#)

**Sub class of** [wo:Weight](#)

**OWL Class**

**RDFS Class**

[\[#\]](#) [\[back to top\]](#)

Class: `cco:CognitiveCharacteristic`

*Cognitive Characteristic* - A cognitive characteristic object, which also can have weightings and characteristic dynamics etc. for describing a cognitive pattern.

**Status:** unstable

**Properties include:** [characteristic\\_dynamics](#) [topic](#) [agent](#) [overall\\_weight](#) [activity](#) [attention\\_duration](#) [characteristic\\_statistical\\_item](#)

**Used with:** [habit](#)

**Sub class of** [scovo:Item](#)

**OWL Class**

**RDFS Class**

[\[#\]](#) [\[back to top\]](#)

### Properties

Property: `cco:activity`

*has activity* - An activity, which is related to a topic of a cognitive characteristic description, e.g. if the topic is football a related activity can be playing or watching.

**Status:** testing

**Domain:** [Cognitive Characteristic](#)

**Sub property of** [ao:activity\\_event\\_factor](#)

<p><b>RDF Property</b> <b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:agent</p> <p><i>has agent</i> - A link from a mined cognitive characteristic to the related person</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Range:</b> <a href="#">foaf:Agent</a></p> <p><b>Inverse property of</b> <a href="#">has habit</a></p> <p><b>RDF Property</b> <b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:appear_time</p> <p><i>has appear time</i> - The time when the cognitive pattern appears in a certain kind of scenario.</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">cco:CognitiveCharacteristic</a> or <a href="#">cco:CharacteristicDynamics</a></p> <p><b>Sub property of</b> <a href="#">event:time</a></p> <p><b>RDF Property</b> <b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:attention_duration</p> <p><i>has attention duration</i> - An interval of attention for a cognitive pattern.</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Range:</b> <a href="#">time:Interval</a></p> <p><b>Sub property of</b> <a href="#">scovo:dimension</a> <a href="#">event:time</a></p> <p><b>Has sub property</b> <a href="#">has ultimative duration</a> <a href="#">has longest duration</a></p> <p><b>RDF Property</b> <b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:belief</p> <p><i>has belief</i> - An uncertain relation for competence representation. That means beliefs, persuasions or opinions, which can also be misconceptions.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has competence</a></p> <p><b>RDF Property</b> <b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:characteristic</p> <p><i>has characteristic</i> - Relates to the applied cognitive characteristic (property), e.g. competence, belief, expertise, skill, interest or setting.</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Range:</b> <a href="#">rdf:Property</a></p> <p><b>RDF Property</b> <b>Functional Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:characteristic_dynamics</p> <p><i>has characteristic dynamics</i> - To relate a cognitive characteristic to its temporal dynamics.</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Range:</b> <a href="#">Characteristic Dynamics</a></p>

<p><b>Sub property of</b> <a href="#">event:sub_event</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:cognitive_characteristic</p> <p><i>has cognitive characteristic</i> - This is the super property to describe cognitive characteristics of the user of the cognitive pattern dimension, e.g. interests, skills, or expertise.</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">foaf:Agent</a></p> <p><b>Range:</b> <a href="#">owl:Thing</a></p> <p><b>Has sub property</b> <a href="#">has interest</a> <a href="#">has competence</a> <a href="#">has setting</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:competence</p> <p><i>has competence</i> - The competence to (be able to) do or know something. That means abilities, skills, knowledge, expertise, beliefs etc.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has cognitive characteristic</a></p> <p><b>Has sub property</b> <a href="#">has belief</a> <a href="#">has expertise</a> <a href="#">has skill</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:expertise</p> <p><i>has expertise</i> - The knowledge or expertise in a certain domain or specific topic, e.g. football, programming languages or music.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has competence</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:interest</p> <p><i>has interest</i> - This property relates a certain area of interest or preference to an agent. That means this agent likes this topic somehow.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has cognitive characteristic</a></p> <p><b>Equivalent Property</b> <a href="#">foaf:topic_interest</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:longest_duration</p> <p><i>has longest duration</i> - The longest continuous interval of attention for a cognitive pattern, e.g. for an interest, if it appears in the following years: 1990, 1991, 1995, 1996, 1997, 1998, 2001, then the longest duration is 4 years.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has attention duration</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:overall_weight</p> <p><i>has overall weight</i> - This weight reflects the overall interest in a topic and should be different from the actual weight of a cognitive characteristic.</p> <p><b>Status:</b> testing</p>

<p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Sub property of</b> <a href="#">scovo:dimension</a> <a href="#">wo:weight</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p><b>Functional Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:setting</p> <p><i>has setting</i> - A certain setting or preference. Often re. a specific environment, e.g. an application.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has cognitive characteristic</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:skill</p> <p><i>has skill</i> - The ability or skill to (be able to) do something, e.g. to walk, to play the piano or to work in a team.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has competence</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:statistical_item</p> <p><i>has statistical item</i> - A link from a cognitive characteristic to statistics about itself</p> <p><b>Status:</b> testing</p> <p><b>Domain:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Range:</b> <a href="#">scovo:Item</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:ultimative_duration</p> <p><i>has ultimative duration</i> - The overall duration of attention for a cognitive pattern, e.g. for an interest, if it appears in the following years: 1990, 1991, 1995, 1996, 1997, 1998, 2001, then the longest duration is 7 years.</p> <p><b>Status:</b> testing</p> <p><b>Sub property of</b> <a href="#">has attention duration</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:evidence</p> <p><i>has evidence</i> - A link between a context and evidence supporting the interpretation of habits in a context</p> <p><b>Status:</b> unstable</p> <p><b>Domain:</b> <a href="#">cco:CognitiveCharacteristic</a> or <a href="#">cco:CharacteristicDynamics</a></p> <p><b>Sub property of</b> <a href="#">event:factor</a></p> <p><b>RDF Property</b></p> <p><b>Object Property</b></p> <p style="text-align: right;"><a href="#">[#]</a> <a href="#">[back to top]</a></p>
<p>Property: cco:habit</p> <p><i>has habit</i> - A link between an agent and a cognitive characteristic description</p> <p><b>Status:</b> unstable</p> <p><b>Domain:</b> <a href="#">foaf:Agent</a></p> <p><b>Range:</b> <a href="#">Cognitive Characteristic</a></p> <p><b>Has inverse property</b> <a href="#">has agent</a></p>



<b>RDF Property</b> <b>Object Property</b>	<a href="#">[#]</a> <a href="#">[back to top]</a>
Property: <code>cco:not_interested_in</code> <i>is not interested in</i> - A link between an agent and a topic of no interest to them <b>Status:</b> unstable <b>Domain:</b> <a href="#">foaf:Agent</a> <b>Range:</b> <a href="#">owl:Thing</a> <b>RDF Property</b> <b>Object Property</b>	<a href="#">[#]</a> <a href="#">[back to top]</a>
Property: <code>cco:topic</code> <i>has topic</i> - A topic of the cognitive characteristic. <b>Status:</b> unstable <b>Domain:</b> <a href="#">Cognitive Characteristic</a> <b>Range:</b> <a href="#">owl:Thing</a> <b>Sub property of</b> <a href="#">dcterms:subject</a> <b>RDF Property</b> <b>Object Property</b>	<a href="#">[#]</a> <a href="#">[back to top]</a>

## Individuals

Individual: <code>cco:ExplicitMining</code> <i>Explicit Mining</i> - An explicitly mined cognitive pattern <b>Status:</b> testing <b>Type:</b> <a href="#">scovo:Dimension</a>	<a href="#">[#]</a> <a href="#">[back to top]</a>
Individual: <code>cco:ImplicitMining</code> <i>Implicit Mining</i> - An implicitly mined cognitive pattern <b>Status:</b> testing <b>Type:</b> <a href="#">scovo:Dimension</a>	<a href="#">[#]</a> <a href="#">[back to top]</a>

## External Vocabulary References

The description of the terms in the *Cognitive Characteristics Ontology* 'dictionary' make reference to classes and properties elsewhere. This section of the *Cognitive Characteristics Ontology* specification provides a placeholder reference for any *Cognitive Characteristics Ontology* mention of externally defined terms. For example, sometimes we might say that *Counter Ontology* property has a domain or range of an externally defined class, or that a *Cognitive Characteristics Ontology* class is a sub-class of an external class, or 'disjoint with' such a class (ie. has no common members). Such claims help fix the intended meaning of *Cognitive Characteristics Ontology* terms in relationship to other 'peer' vocabularies. Currently, the *Cognitive Characteristics Ontology* sub classes:

### [wo:Weight](#)

A weight class to enable timestamped (etc.) weights.

### [scovo:item](#)

A statistical data item; is a kind of [Event](#).

## Status Vocabulary

Each term in the *Cognitive Characteristics Ontology* is annotated with properties from the [SemWeb Vocab Status Ontology](#).

Note that this mechanism is itself somewhat experimental and evolvin. The definitions of 'stable', 'unstable', 'archaic' and 'testing' cannot be defined as global absolutes, but only in relationship to the practices, expectations and social structures around some vocabulary. For their use in the *Cognitive Characteristics Ontology*, future versions of this specification could usefully offer more detail about what to expect from a term labelled 'stable'.

**vs:term\_status**

The vs:term\_status property indicates the status of a vocabulary term, one of 'stable','unstable','testing' or 'archaic'.

## Acknowledgments

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## Recent Changes

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=====
Version 0.2 (September 2010)
=====
* ADDED: cco:characteristic - relates to the applied cognitive characteristic (property), e.g. competence, belief, ex
  interest or setting

=====
Version 0.1 (September 2010)
=====
* IMPORTED: all concepts and properties of the former Weighted Interests Vocabulary and introduced a new namespace cc
* MODIFIED: renamed wi:interest_dynamics to cco:characteristic_dynamics
* MODIFIED: renamed wi:InterestDynamics to cco:CharacteristicDynamics
* MODIFIED: renamed wi:WeightedInterest to cco:CognitiveCharacteristic
* MODIFIED: renamed wi:preference to wi:habit
* ADDED: cco:cognitive_characteristic - this is the super property to describe cognitive characteristics of the user
  pattern dimension, e.g. interests, skills, or expertise
* ADDED: cco:competence - the competence to (be able to) do or know something. That means abilities, skills, knowledg
  beliefs etc.
* ADDED: cco:belief - an uncertain relation for competence representation. That means beliefs, persuasions or opinion
  be misconceptions
* ADDED: cco:skill - the knowledge or expertise in a certain domain or topic, e.g. football, programming languages or
* ADDED: cco:interest - this is the super property to describe cognitive characteristics of the user of the cognitive
  dimension, e.g. interests, skills, or expertise
* ADDED: cco:setting - a certain setting or preference. Often re. a specific environment, e.g. an application
* ADDED: cco:activity - an activity, which is related to a topic of a cognitive charateristic description, e.g. if th
  football a related activity can be playing or watching
* MODIFIED: cco:attention_duration - now also as a sub property of scovo:dimension
* MODIFIED: cco:overall_weight - now also as a sub property of scovo:dimension
* MODIFIED: cco:not_interested_in - added owl:Thing as rdfs:range
* MODIFIED: cco:topic - added owl:Thing as rdfs:range

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