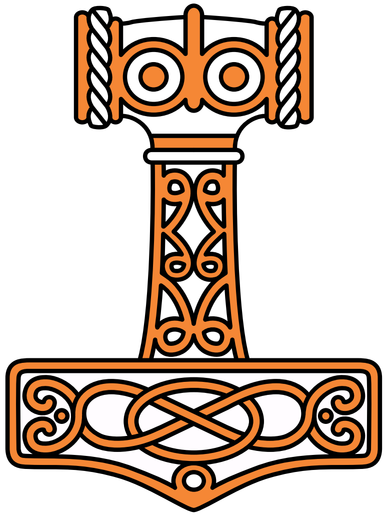
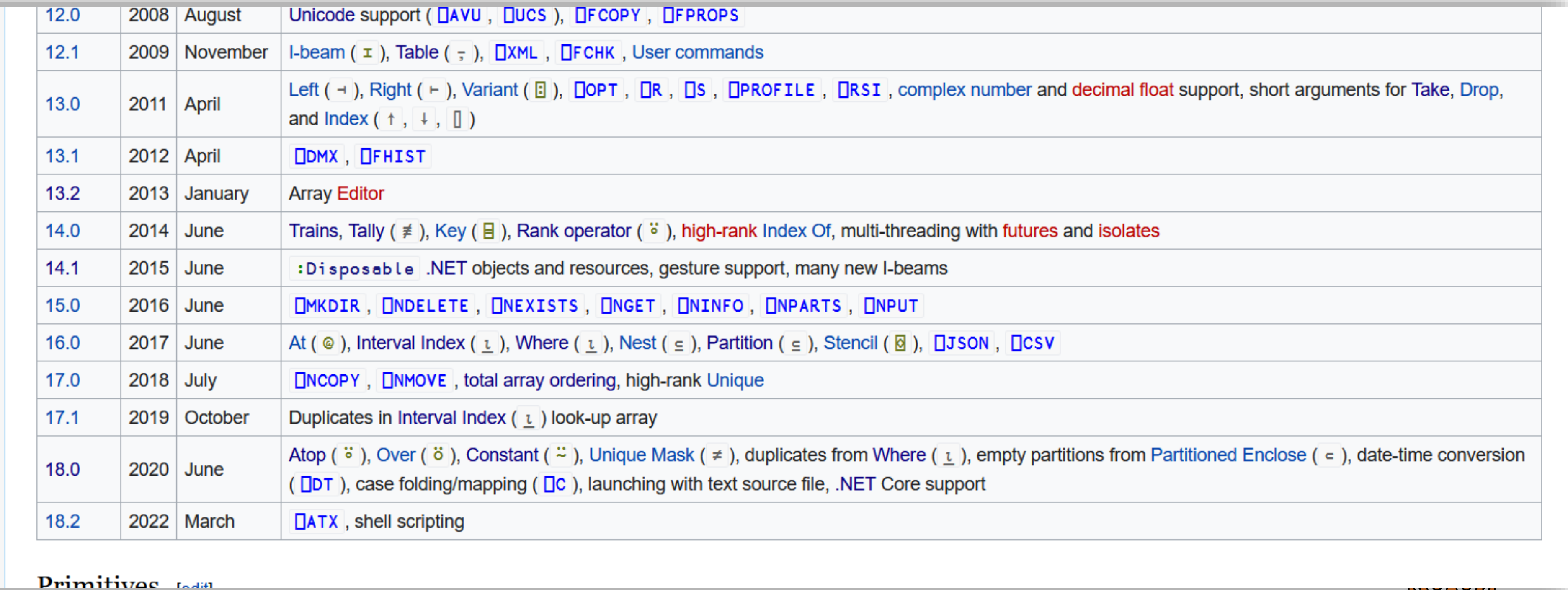
DYALOG

Olhão 2022

Recent Language Features



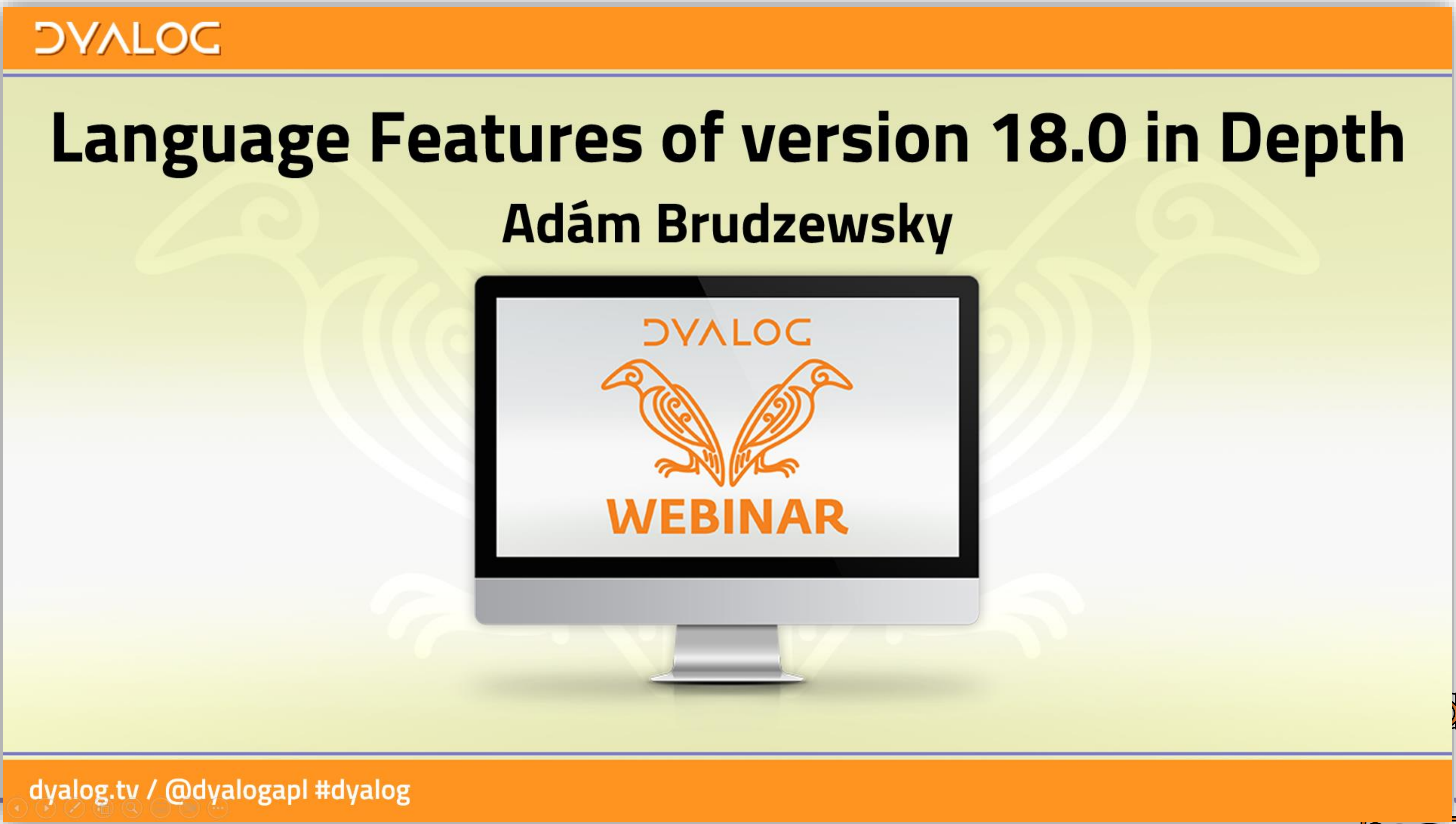
Rich Park, Rodrigo Girão Serrão



12.0	2008	August	Unicode support (⎕AVU , ⎕UCS), ⎕FCOPY , ⎕FPROPS
12.1	2009	November	I-beam (⌶), Table (⍪), ⎕XML , ⎕FCHK , User commands
13.0	2011	April	Left (⊣), Right (⊢), Variant (⍠), ⎕OPT , ⎕R , ⎕S , ⎕PROFILE , ⎕RSI , complex number and decimal float support, short arguments for Take, Drop, and Index (↑ , ↓ , ⌷)
13.1	2012	April	⎕DMX , ⎕FHIST
13.2	2013	January	Array Editor
14.0	2014	June	Trains, Tally (≢), Key (⌸), Rank operator (⍤), high-rank Index Of, multi-threading with futures and isolates
14.1	2015	June	:Disposable .NET objects and resources, gesture support, many new I-beams
15.0	2016	June	⎕MKDIR , ⎕NDELETE , ⎕NEXISTS , ⎕NGET , ⎕NINFO , ⎕NPARTS , ⎕NPUT
16.0	2017	June	At (@), Interval Index (⍸), Where (⍸), Nest (⊆), Partition (⊆), Stencil (⌺), ⎕JSON , ⎕CSV
17.0	2018	July	⎕NCOPY , ⎕NMOVE , total array ordering, high-rank Unique
17.1	2019	October	Duplicates in Interval Index (⍸) look-up array
18.0	2020	June	Atop (⍤), Over (⍥), Constant (⍨), Unique Mask (≠), duplicates from Where (⍸), empty partitions from Partitioned Enclose (⊂), date-time conversion (⎕DT), case folding/mapping (⎕C), launching with text source file, .NET Core support
18.2	2022	March	⎕ATX , shell scripting

Primitives [edit]

View>Master Views>Slide Master then [PgUp] to edit title!



DYALOG

Language Features of version 18.0 in Depth

Adám Brudzewsky

DYALOG
WEBINAR

dyalog.tv / @dyalogapl #dyalog

View>Master Views>Slide Master then [PgUp] to edit title!

New

`⎕C`	Case convert
`f⍥g`	Over
`f⍤g`	Atop
`≠Y`	Unique mask
`A⍨`	Constant
`⎕DT`	Date-time
`1200⌶`	Format date-time

Improved

```
⎕JSON⍠'HighRank'
⎕JSON⍠'Dialect'
⎕R/⎕S⍠'Regex'
⎕NPUT⍠'NEOL'
⍸Y
X⊆Y
↑[k]Y
```

Dyalog version 18 language features

Primitive operators

`⍤ ⍥ ⍨`

Primitive functions

`≠ ⍸ ⊂`

System functions

`⎕C ⎕DT 1200⌶ ⎕JSON ⎕R/⎕S ⎕ATX`

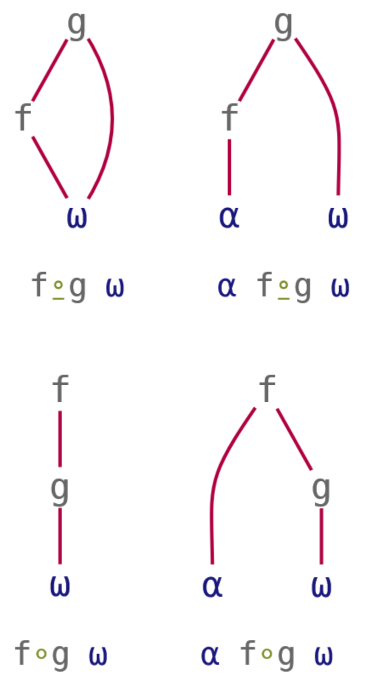
Primitive operators

Function composition apl.wiki/Function_composition

Composition	Notation	Monadic	Dyadic
Beside	`F∘G`	`F G ω`	`α F G ω`
Atop	`F⍤G`	`F G ω`	`F α G ω`
Over	`F⍥G`	`F G ω`	`(G α)F (G ω)`
Fork	`(FGH)`	`(F ω) G (H ω)`	`(α F ω)G(α F ω)`
Behind	`F⍛G`	`(F ω) G ω`	`(F α) G ω`

Function composition

Composition	Notation	Monadic	Dyadic
Beside	F∘G	F G ⍵	⍺ F G ⍵
Behind	F⍛G	(F ⍵) G ⍵	(F ⍺) G ⍵



Pre-process right argument

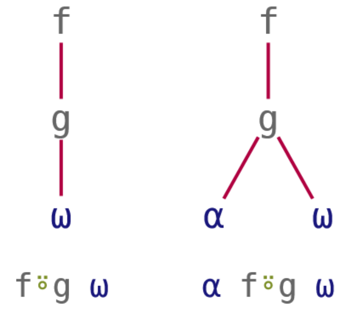
```
        2⊃∘⎕VFI¨ '3 4.2 and 5' '6 7' '12 more'
```

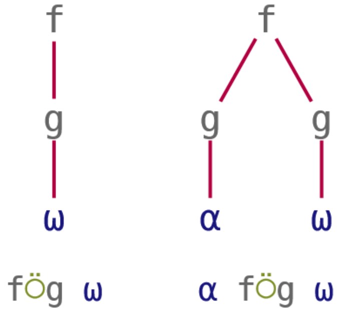
Pre-process left argument

```
        array ⍴⍛⍴ values
```

Function composition

Composition	Notation	Monadic	Dyadic
Atop	F⍤G	F G ⍵	F ⍺ G ⍵
Over	F⍥G	F G ⍵	(G ⍺)F (G ⍵)





Post-process result

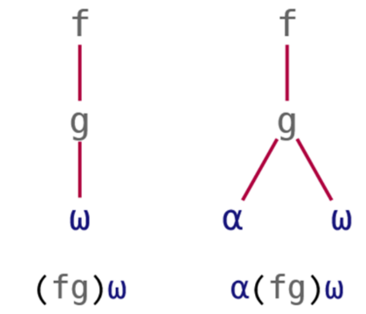
```
        3 4 5 ⌊⍤÷ 7 2 9
```

Pre-process both arguments

```
        ≢⍥,
        +/⍥≢
```

Function composition

Composition	Notation	Monadic	Dyadic
Atop	(FG)	F G ⍵	F ⍺ G ⍵
Fork	(FGH)	(F⍵)G(H⍵)	(⍺F⍵)G(⍺H⍵)

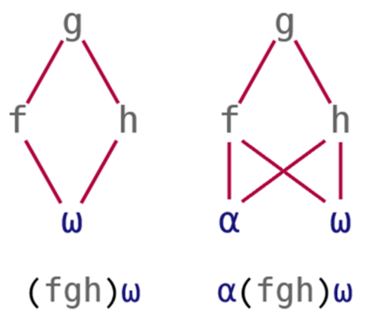


Post-process result

```
      3 4 5 (⌊÷) 7 2 9
```

Pre-process both arguments

```
      5 2 3.2 8 (≢⍤, ≡ +/⍤≢) 'ABCD'
```



Primitive operators

Function composition

Pre-process right argument

```
        2⊃∘⎕VFI¨ '3 4.2 and 5' '6 7' '12 more'
```

Pre-process left argument

```
        array ⍴⍛⍴ values
```

Pre-process both arguments

```
        vec1 (≢⍥,≡+/⍥≢) vec2
```

Post-process result

```
        3 4 5 ⌊⍤÷ 7 2 9
```

Pre-process separately

```
        x⍉⍛(+.×)∘÷y
```

Constant `A⍨`

Lightweight notation

Train `{A}×h`

At `{A}@h`

Constant `A⍨`

Lightweight notation

Train	`{A}×h`	`A×h`
At	`{A}@h`	`A@h`
Constant	`{A}`	

Constant `A⍨`

Lightweight notation

Train	~~`{A}×h`~~	`A×h`
At	~~`{A}@h`~~	`A@h`
Constant	~~`{A}`~~	`A⍨`

Constant A⍨

Lightweight notation

```
      3 5⍴⎕A
ABCDE
FGHIJ
KLMNO
      'jk'⍨¨3 5⍴⎕A
┌──┬──┬──┬──┬──┐
│jk│jk│jk│jk│jk│
├──┼──┼──┼──┼──┤
│jk│jk│jk│jk│jk│
├──┼──┼──┼──┼──┤
│jk│jk│jk│jk│jk│
└──┴──┴──┴──┴──┘
```

```
      'jk'⍴⍨⍴3 5⍴⎕A
jkjkj
kjkjk
jkjkj
      'jk'⍴∘⊂⍨⍴3 5⍴⎕A
┌──┬──┬──┬──┬──┐
│jk│jk│jk│jk│jk│
├──┼──┼──┼──┼──┤
│jk│jk│jk│jk│jk│
├──┼──┼──┼──┼──┤
│jk│jk│jk│jk│jk│
└──┴──┴──┴──┴──┘
```

Constant A⍨

Avoid ugly work-arounds

```
      mask←1 0 0 0 1 0 0 ⋄ data←'AbcdEfg'

      '□'@{mask}data
□bcd□fg

      (mask/data)←'□' ⋄ data
□bcd□fg
```

Constant A⍨

Avoid ugly work-arounds

```
      mask←1 0 0 0 1 0 0 ⋄ data←'AbcdEfg'

      mask{'□'@{α}ω}data
VALUE ERROR
      mask{'□'@{α}ω}data
               ^
      mask{'□'@(α⍨)ω}data
□bcd□fg
```

Exercises

https://is.gd/MXvf9r

Primitive Functions

Unique mask	`≠⍵`
Where	`⍸⍵`
Partitioned enclose	`⍺⊂⍵`

Unique mask ≠⍵

a.k.a. nub-sieve

```
      ∪'Mississippi'
Misp

      {↑⍵(≠⍵)}'Mississippi'
M i s s i s s i p p i
1 1 1 0 0 0 0 0 1 0 0
```

Why, though?

≠Y is to ∪Y

as

⍋Y is to `Sort Y`

⍋Y vs Sort Y

```
      Sort 3 1 4 1 5
1 1 3 4 5
      ⍋ 3 1 4 1 5
2 4 1 3 5
      'Moses'[2 4 1 3 5]
oeMss
```

≠Y vs ∪Y

```
      ∪ 3 1 4 1 5
3 1 4 5
      ≠ 3 1 4 1 5
1 1 1 0 1
      1 1 1 0 1 / 'Moses'
Moss
```

Where ⍸⍵

Now accepts non-negative integers (not just Bool!)

History

```
      PRICE←71 82 81 82 84 59
      (75≤PRICE)/PRICE
82 81 82 84
      (75≤PRICE)/⍳⍴PRICE
2 3 4 5
```

1960

History

```
      PRICE←71 82 81 82 84 59
      (75≤PRICE)/PRICE
82 81 82 84
      (75≤PRICE)/ιρPRICE
2 3 4 5
      ι75≤PRICE
2 3 4 5
```

2017

Selection

Using Where

⍸

Use case: selection

```
      fruit←'Apple' 'Banana' 'Cherry' 'Date' 'Elderberry'
      select←1 1 0 1 0
      select/fruit
 Apple  Banana  Date
      select/⍳⍴select
1 2 4
      ⍸select
1 2 4
```

Use case: selection

```
      fruit←'Apple' 'Banana' 'Cherry' 'Date' 'Elderberry'
      select←1 1 0 1 0
      select/fruit
 Apple  Banana  Date
      fruit[⍸select]
 Apple  Banana  Date
```

Use case: multi-selection

```
      fruit←'Apple' 'Banana' 'Cherry' 'Date' 'Elderberry'
      select←1 2 0 1 0
      select/fruit
 Apple  Banana  Banana  Date
      fruit[⍸select]
     N ERROR
      fruit[⍸select]
            ^
```

1980

17·1

Use case: multi-selection

```
      fruit←'Apple' 'Banana' 'Cherry' 'Date' 'Elderberry'
      select←1 2 0 1 0
      select/fruit
 Apple  Banana  Banana  Date
      fruit[⍸select]
     e  Banana  Banana  Date
```

18·0

Use case: multi-dimensional selection

```
      spice←'Anise' 'Basil' 'Chili' 'Dill' 'Epazote'
      ⎕←stuff←↑fruit spice
 Apple  Banana  Cherry  Date  Elderberry
 Anise  Basil   Chili   Dill  Epazote
      ⎕←select←↑select (0 0 0 2 0)
1 2 0 1 0
0 0 0 2 0
```

Use case: multi-dimensional selection

```
      stuff[⍸select]
 Apple  Banana  Banana  Date  Dill  Dill


      select/stuff
RANK ERROR
      select/stuff
            ∧
```

Representing a set

Using Where

⍸

Use case: Representing a set

```
      all     ← 'a' 'b' 'c' 'd' 'e' 'f'
      mask    ←  1   0   0   1   0   1
      indices ←  1           4       6
      indices ≡ ⍸ mask
1
```

Use case: Representing a multi-set

```
      all     ← 'a' 'b' 'c' 'd' 'e' 'f'
      count   ←  1   0   0   3   0   2
      indices ←  1          4 4 4    6 6
      indices ≡ ⍸ count
1
      count   ≡ ⍰   indices
1
```

Use case: Representing a multi-set

```
      all     ← 'a' 'b' 'c' 'd' 'e' 'f'
      count   ←  1   0   0   3   0   2
      indices ←  1          4 4 4   6 6
      indices ≡ ⍸ count
1
      count   ≡⍸⍣¯1⊢indices
1
```

Partitioned enclose ⍺⊆⍵

Now accepts non-negative integers (not just Bool!)

Can take a short left argument

```
cutoffs ← 0 20 40 60 80 100
values  ← 3 14 15 35 65 89 92 793
```

```
      cutoffs ← 0         20 40 60    80       100
      values  ← 3 14 15   35    65    89 92    793
      cutoffs ⍸ values
1 1 1 2 4 5 5 6
      values⊂⍨1,¯2-/cutoffs⍸values
┌───────┬──┬┬──┬─────┬───┐
│3 14 15│35││65│89 92│793│
└───────┴──┴┴──┴─────┴───┘
```

```
      1 1 ⊂ 'head' 'and' 'the' 'rest'
LENGTH ERROR
      1 1⊂'head' 'tail' 'and' 'the' 'rest'
         ∧
      1 1 ⊂ 'head' 'and' 'the' 'rest'
┌──────┬──────────────┐
│┌────┐│┌───┬───┬────┐│
││head│││and│the│rest││
│└────┘│└───┴───┴────┘│
└──────┴──────────────┘
```

Exercises

https://is.gd/jTKznr

System Functions

```
⎕C ⎕DT 1200⌶ ⎕JSON ⎕ATX
```

Case Convert ⎕C

```
⎕C ⎕DT 1200⌶ ⎕JSON ⎕R/⎕S ⎕ATX
```

Wait, what?

Uppercase:	`1(819⌶)Y`	⇨	`1 ⎕C Y`
Lowercase:	`819⌶Y`	⇨	`⎕C Y`
Lowercase:	`0(819⌶)Y`	⇨	`⎕C Y`

```
Big←{⍺←0
     ⍺:1 ⎕C ⍵
     ⎕C ⍵}
```

Pain without gain?

```
      819⌶'Hi'#(3J14 'PI')
DOMAIN ERROR: Invalid right argument
      819⌶'Hi'#(3J14 'PI')
         ∧
      ⎕C'Hi'#(3J14 'PI')
 hi  #  3J14  pi
```

Pain without gain?

```
      + 'Hi'#(3J14 'PI')
Hi  #  3J¯14  PI



      ⎕C'Hi'#(3J14 'PI')
hello  #  3J14  pi
```

Case Convert

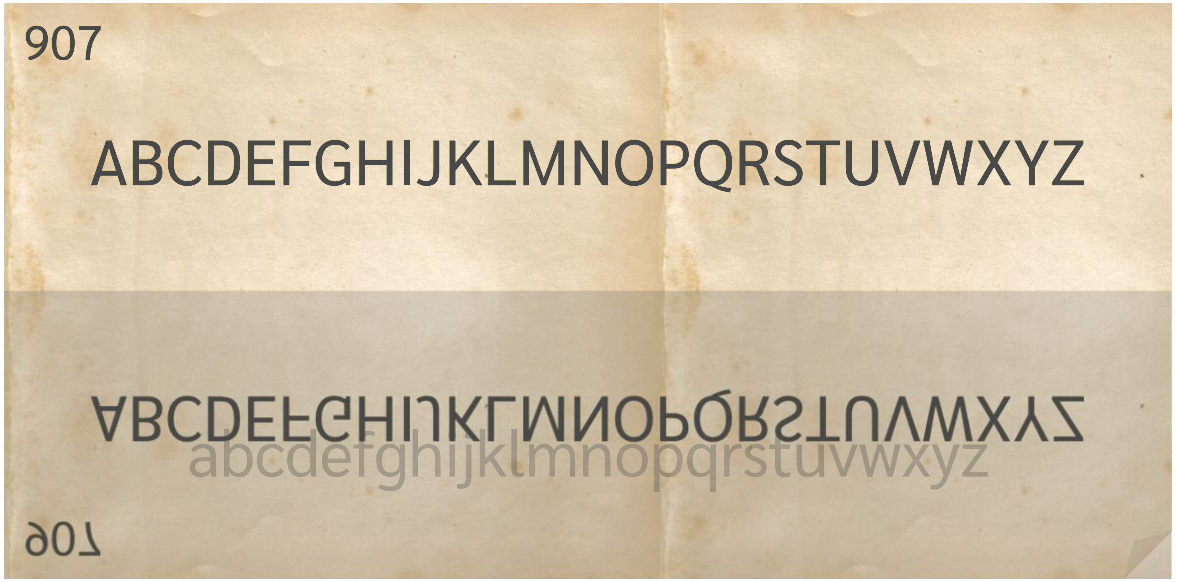
Monadic ⎕C: Case **Fold**

normalisation
for machine comparison

Dyadic ⎕C: Case **Map**

display form
for human readers

Case Folding: ⎕C Y



Case Mapping: X ⎕C Y

1 : Upper		Origin		¯1 : Lower
A	⇦	A|a	⇨	a
B	⇦	B|b	⇨	b
C	⇦	C|c	⇨	c
D	⇦	D|c	⇨	d
E	⇦	E|e	⇨	e
F	⇦	F|f	⇨	f
G	⇦	G|g	⇨	g

Folding vs Mapping

```
      'Μωυσής'
Μωυσής
      ⎕C'Μωυσής'    ⍝ fold
μωυσήσ
      ¯1⎕C'Μωυσής' ⍝ map
μωυσής
```

"Moses" in Greek

Folding vs Mapping

```
      ⎕C 'Μωυσής' 'ΜΩΥΣΉΣ'      ⍝ fold
 μωυσήσ  μωυσήσ
      ¯1 ⎕C 'Μωυσής' 'ΜΩΥΣΉΣ' ⍝ map
 μωυσής  μωυσήσ
```

Folding vs Mapping

```
      ⎕C 'Mωυσής' 'ΜΩΥΣΉΣ'     ⍝ fold
 μωυσήσ  μωυσήσ
      1 ⎕C 'Mωυσής' 'ΜΩΥΣΉΣ'   ⍝ map
 ΜΩΥΣΉΣ  ΜΩΥΣΉΣ
```

Folding vs Mapping

"Street" in German

```
      ⎕C 'Straße' 'STRAẞE'     ⍝ fold
straße  straße
      1 ⎕C 'Straße' 'STRAẞE'   ⍝ map
STRAßE  STRAẞE



STRASSE  STRASSE
```

Would you ever map?

- All-lowercase to generate URLs or hash-tags

```
'Ο Μωυσής Ζει' ⇨ '#ομωυσήςζει'
```

- All-caps for display purposes

```
'Sale' ⇨ 'S A L E'
```

- Title-case a heading…

```
'Would you ever map?' ⇨
   'Would You Ever Map?'
```

```
      t←'Would you ever map?'
      ¯1*0,¯1↓' '≠t
1 ¯1 ¯1 ¯1 ¯1 ¯1 1 ¯1 ¯1 ¯1 1 ¯1 ¯1 ¯1 ¯1 1 ¯1 ¯1 ¯1
      (¯1*0,¯1↓' '≠t)⎕C t
DOMAIN ERROR: Invalid left argument
      (¯1*0,¯1↓' '≠t)⎕C t
                     ∧
      (¯1*0,¯1↓' '≠t)⎕C¨t
Would You Ever Map?
```

Date times ⎕DT

Is it Christmas Yet? – **Richard Smith**, *Dyalog '19*

dyalog.tv/Dyalog19/?v=SVcNgQewYNY

Date-time

Timestamp

Time number

Military time zone

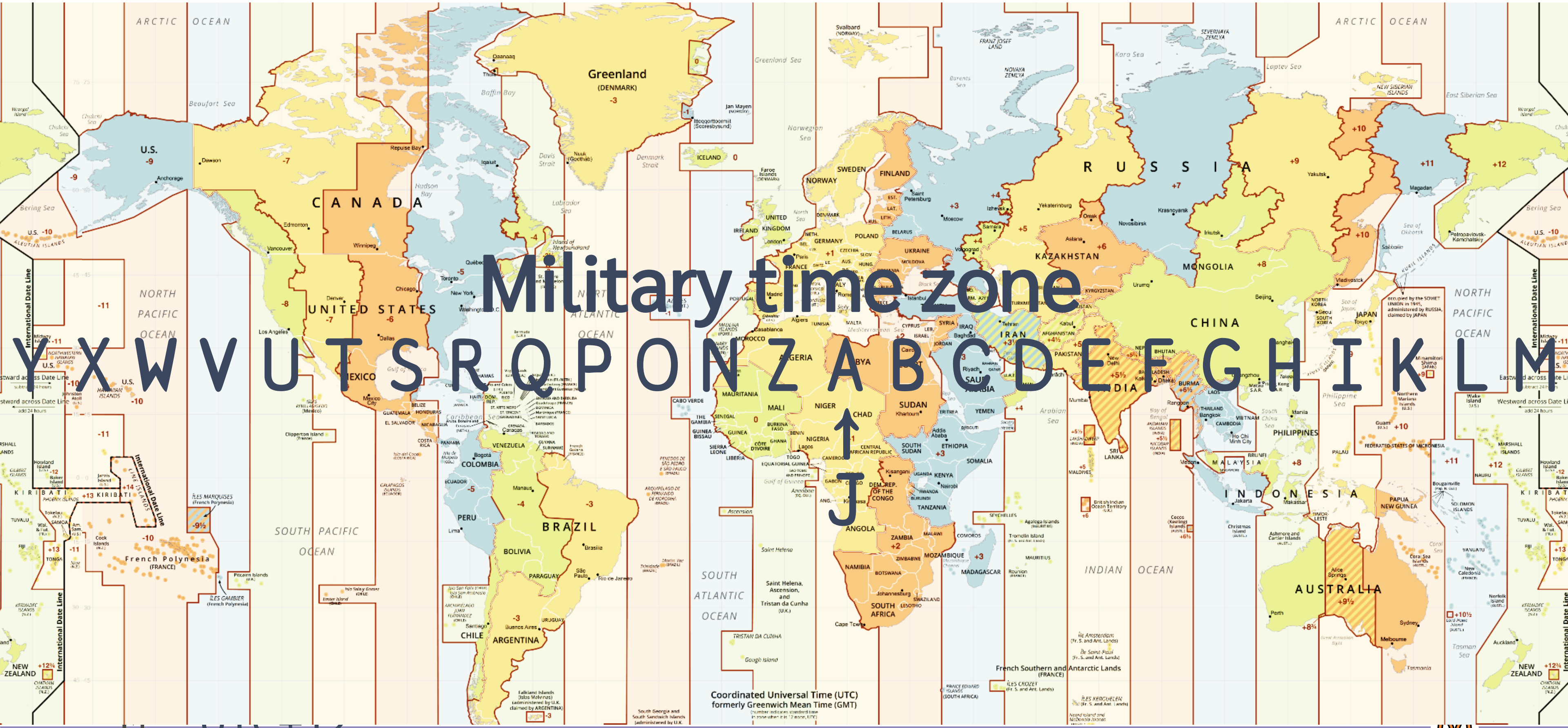
Timestamp

year month day… ms	`2020 6 11 16 0 0 0`	← WEST —— ⎕TS
year week weekday… µs	`2020 24 4 16 0 0 0`	

Time number

days since 1899-12-31 00:00	43992.70833	← WEST
seconds since 1970-01-01 00:00	1591894800	

Military time zone


Y X W V U T S R Q P O N Z A B C D E F G H I K L M
↑
J
Coordinated Universal Time (UTC)
formerly Greenwich Mean Time (GMT)

Time numbers

1	**Dyalog day number**
2	Dyalog component file
10	J nanoseconds
11	Shakti K milliseconds
12	JavaScript/D/Q ms
13	R chron format
20	Unix time
30	MS-DOS date/time
31	MS-Win32 FILETIME

et cetera ad abundantiam

Timestamps

¯1	**⎕TS-style: year month… ms**
¯2	Like ⎕TS but μs replacing ms
¯3	Like ⎕TS but ns replacing ms
¯10	ISO year day hour min sec μs
¯11	ISO year week weekday… μs

etc.

⎕DT syntax

Conversion

```
       outCode ⎕DT dateTimes
inCode outCode ⎕DT dateTimes
```

Validation

```
       0 ⎕DT dateTimes
inCode 0 ⎕DT dateTimes
```

⎕DT syntax: one-element left argument

Conversion: ⎕TS-style timestamp to Unix time

```
      20 ⎕DT ⊂ 2020 06 11  16 00 00 000
1591891200
```

Validation: Leap year check

```
      0 ⎕DT ⊂ 1900 02 29
0
```

⎕DT syntax: one-element left argument

Conversion: Current ⎕TS-style UTC time

```
      ¯1 ⎕DT 'Z'
 2020 6 11 16 0 0 0
```

What time zone am I in?

```
      3600÷⍨-/20 ⎕DT 'JZ'
1    ← WEST=UTC+1
```

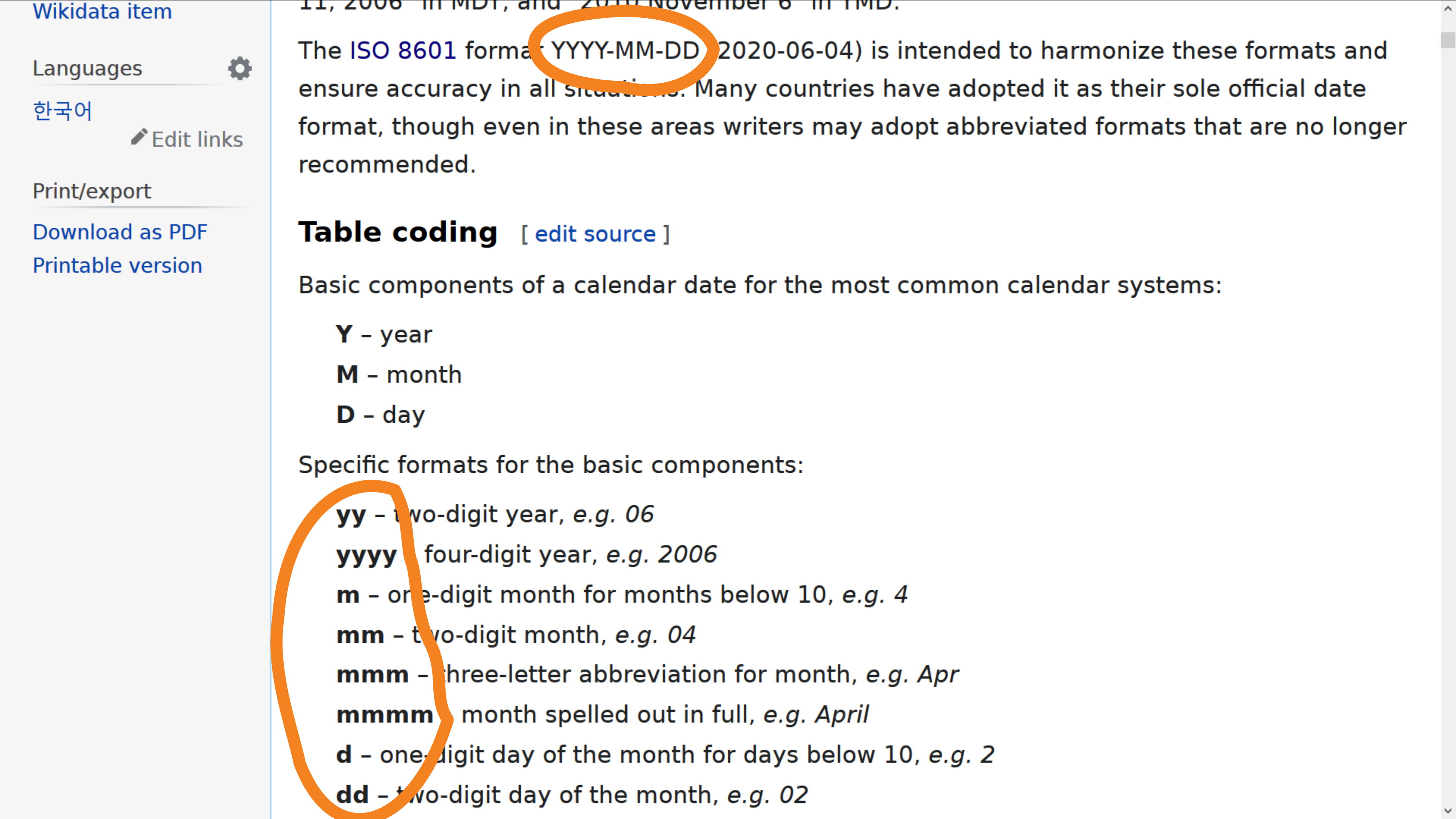
⎕DT syntax: two-element left argument

Conversion: Unix time to ⎕TS-style timestamp

```
      20 ¯1 ⎕DT 1591891200
 2020 6 11 16 0 0 0
```

Validation: Leap year check

```
      60 0 ⎕DT 19000229
0
```



Wikidata item

Languages

한국어

Edit links

Print/export

Download as PDF

Printable version

11, 2006" in MDY, and "2006 November 6" in YMD.

The ISO 8601 format YYYY-MM-DD (2020-06-04) is intended to harmonize these formats and ensure accuracy in all situations. Many countries have adopted it as their sole official date format, though even in these areas writers may adopt abbreviated formats that are no longer recommended.

Table coding [edit source]

Basic components of a calendar date for the most common calendar systems:

Y – year

M – month

D – day

Specific formats for the basic components:

yy – two-digit year, *e.g. 06*

yyyy – four-digit year, *e.g. 2006*

m – one-digit month for months below 10, *e.g. 4*

mm – two-digit month, *e.g. 04*

mmm – three-letter abbreviation for month, *e.g. Apr*

mmmm – month spelled out in full, *e.g. April*

d – one-digit day of the month for days below 10, *e.g. 2*

dd – two-digit day of the month, *e.g. 02*

1200⌶ syntax

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

1200⌶ syntax: patterns

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

```
'M'        '6'
'MM'       '06'
'MMM'      'JUN'
'MMMM'     'JUNE'
```

1200⌶ syntax: numbers

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

```
'M'          '6'
'MM'         '06'
'_M'         ' 6'
```

1200⌶ syntax: names

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

`'MMMM'`	`'JUNE'`
`'__en__MMMM'`	`'JUNE'`
`'__ru__MMMM'`	`'ИЮНЬ'`
`'__fr__MMMM'`	`'JUIN'`

1200⌶ syntax: names

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

'mmmm'	'june'
'Mmmm'	'June'
'MMMM'	'JUNE'

1200⌶ syntax: names

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

	__en__	__fr__
'mmmm'	'june'	'juin'
'Mmmm'	'June'	'Juin'
'MMMM'	'JUNE'	'JUIN'

1200⌶ syntax: names

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
```

	`__en__`	`__fr__`
`'_mmm'`	`'June'`	`'juin'`
`'mmmm'`	`'june'`	`'juin'`
`'Mmmm'`	`'June'`	`'Juin'`
`'MMMM'`	`'JUNE'`	`'JUIN'`

1200⌶ syntax: ordinals

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
              __en__      __fr__
'D'           '1'         '1'
'Doo'         '1st'       '1er'
'DD'          '11'        '11'
'DDoo'        '11th'      '11'
```

1200⌶ syntax: ordinals

Format one or more date-times

```
'YYYY-MM-DD' (1200⌶) dyalogDateNumbers
              __en__       __da__
'D'           '1'          '1'
'Doo'         '1st'        '1.'
'DD'          '11'         '11'
'DDoo'        '11th'       '11.'
```

1200⌶ syntax: 12/24 hours

Format one or more date-times

```
'hh:mm' (1200⌶) dyalogDateNumbers
```

```
'h'         '16'
't'         '4'
't pp'      '4 pm'
'tPP'       '4PM'
```

1200⌶ examples

```
      'DDoo Mmmm YYYY "at" hh:mm:ss.fff'
11th June 2020 at 16:00:00.000
      '__da__Dddd, D. mmmm "''"YY'
Torsdag, 11. juni '20
      '%ISO%'
2020-06-11T16:00:00
```

JSON Convert ⎕JSON

Webinar, part 3

```
⎕JSON⍠'HighRank'
⎕JSON⍠'Dialect'
⎕JSON ⊂tables
```

Converting rank>1 arrays to JSON

no need for ↑ and ↓ pre/post-processing

```
⎕JSON⍠'HighRank'
```

Ever tried this?

```
      data←2 3⍴⍳6
      ⎕JSON data
DOMAIN ERROR: JSON export: the right argument ca
      ⎕JSON data
      ∧
```

Ever tried this?

```
      data←2 3⍴⍳6
      ⎕JSON⍠data
[[1,2,3],[4,5,6]]
```

Ever tried this?

```
      data←2 3 4⍴⍳24
      ⎕JSON⍠data
DOMAIN ERROR: JSON export: the right argument ca
      ⎕JSON data
      ∧
```

Ever tried this?

```
      data←2 3 4⍴⍳24
      ⎕JSON⍠⍠data
[[[1,2,3,4],[5,6,7,8],[9,10,11,12]],[[13,14,15,1
```

Ever tried this?

```
data←(2 3⍴⍳6) 'abc'
⎕JSON↓⍤(¯1+≢⍴data)⊢data

↓⍤(¯1+≢⍴data)⊢data
┌─────┬───┐
│0 1 2│abc│
│3 4 5│   │
└─────┴───┘
```

Ever tried this?

```
data←(2 3⍴⍳6) 'abc'
⎕JSON{0=≡⍵:⍵ ⋄ 1<≢⍴⍵:∇↓⍵ ⋄ ∇¨⍵}data

{0=≡⍵:⍵ ⋄ 1<≢⍴⍵:∇↓⍵ ⋄ ∇¨⍵}data
┌─────────────┬───┐
│┌─────┬─────┐│abc│
││0 1 2│3 4 5││   │
│└─────┴─────┘│   │
└─────────────┴───┘
```

Ever tried this?

```
      data←(2 3⍴⍳6) 'abc' ⋄ 'ns'⎕NS'data'
      ⎕JSON{0=≡⍵:⍵ ⋄ 1<≢⍴⍵:∇↓⍵ ⋄ ∇¨⍵}ns
DOMAIN ERROR: JSON export: item "data[1]" of the
⎕JSON{0=≡⍵:⍵ ⋄ 1<≢⍴⍵:∇↓⍵ ⋄ ∇¨⍵}ns
      ^
```

Try this!

```
      data←(2 3⍴⍳6) 'abc' ⋄ 'ns'⎕NS'data'
      ⎕JSON⍠'HighRank' 'Split'   ⊢   ns
{"data":[[[1,2,3],[4,5,6]],"abc"]}
```

Try this!

```
data←(2 3⍴⍳6) 'abc' ⋄ 'ns'⎕NS'data'
⎕JSON⍠'HighRank' 'Split'    ⊢   data

⎕JSON⍠'HighRank' 'Split'⍤2 ⊢   data
┌─────────────┬───┐
│┌─────┬─────┐│abc│
││0 1 2│3 4 5││   │
│└─────┴─────┘│   │
└─────────────┴───┘
```

{JSON:5,}

JSON for Humans

```
⎕JSON⍠'Dialect'
```

JSON

```
{
  "Settings": {
    "9&11": ["\t", "\u000B"],
    "MAXWS": "2GB",
    "ROOTDIR":
"/my-own/root/directory",
    "UserOption": "quote\"me"

  }
}
```

JSON5

```
{
  Settings: {
    "9&11": ["\t", "\v"],



  }
}
```

JSON

```
{
  "Settings": {
    "9&11": ["\t", "\u000B"],
    "MAXWS": "2GB",
    "ROOTDIR":
"/my-own/root/directory",
    "UserOption": "quote\"me"


  }
}
```

JSON5

```
{
  Settings: {
    "9&11": ["\t", "\v"],
    MAXWS: "2GB", // memory limit




  }
}
```

JSON

```
{
  "Settings": {
    "9&11": ["\t", "\u000B"],
    "MAXWS": "2GB",
    "ROOTDIR":
"/my-own/root/directory",
    "UserOption": "quote\"me"

  }
}
```

JSON5

```
{
  Settings: {
    "9&11": ["\t", "\v"],
    MAXWS: "2GB", /* memory limit */
    ROOTDIR: "/my-own/root/direct\
ory",
    UserOption: 'quote"me',

  }
}
```

JSON

```
{
  "Settings": {
    "9&11": ["\t", "\u000B"],
    "MAXWS": "2GB",
    "ROOTDIR":
"/my-own/root/directory",
    "UserOption": "quote\"me"
    "FNAME": "[rootdir]/filename"
  }
}
```

JSON5

```
{
  Settings: {
    "9&11": ["\t", "\v"],
    MAXWS: "2GB", /* memory limit */
    ROOTDIR: "/my-own/root/direct\
ory",
    UserOption: 'quote"me',
    FNAME: '[rootdir]/filename',
  }
}
```

JSON Tables ⎕JSON

```
┌─────┬─────────────────────────┐
│1 2 3│1            0.5         │
│4 5 6│0.3333333333 0.25        │
│     │                         │
│     │0.2          0.1666666667│
│     │0.1428571429 0.125       │
└─────┴─────────────────────────┘
      1 ⎕JSON d
DOMAIN ERROR: JSON export: the right argument cannot be converted (⎕IO=1)
      1 ⎕JSON d
       ∧
      1 (⎕JSON⍠'HighRank' 'Split') d
[[[[1,2],"AB"],["ABC","DEF"]],[[[1,2,3],[4,5,6]],...
```

Raw Text

Wrappers

JSON Tables ⎕JSON

```
      table ←⍉⍪ 'Day' 'Ca$h Money $$$'
      ⎕←table⍪←3 2⍴'Monday' 1000 'Wednesday' 324 'Friday' 52
┌─────────┬────┐
│Monday   │1000│
├─────────┼────┤
│Wednesday│324 │
├─────────┼────┤
│Friday   │52  │
└─────────┴────┘
```

```
      ⎕JSON⍠'Compact'0⊂2,⊂table
[
  {
    "Day": "Monday",
    "Ca$h Money $$$": 1000
  }, {
    "Day": "Wednesday",
    "Ca$h Money $$$": 324
  }, {
    "Day": "Friday",
    "Ca$h Money $$$": 52
  }
]
```

Extended Attributes ⎕ATX

Use ⎕ATX in preference to ⎕AT, ⎕NC, ⎕NR, ⎕SIZE and ⎕SRC (and some of the functionality of 5179⌶).

Press F1

Extended Attributes ⎕ATX

50 – 62

Information about source

Verbatim source: code kept as-typed with `2⎕FIX` and `Link`

Exercises

https://is.gd/Y4IEaK

More Exercises

https://is.gd/IeDpNu