Regular Expression Enhancements

- **New options**

```
/m        Assume multiline (like $* = 1)
/s        Assume single line
/x        Extended--allow whitespace
```

- **Minimal (non-greedy) matching**

```
*?        Minimal *
+?        Minimal +
??        Minimal ?
{n,m}?    Minimal {n,m}
```

- **Extension syntax: (?...)**

```
(?sxi)    Embedded options
(?:...)   Non-backref grouping
(?=...)   Positive lookahead assertion
(?!...)  Negative lookahead assertion
(?#...)  Comment
```

- **Example:**

```
s{ (?xgs)
     /\*       (?# match the slashterisk)
     .*?       (?# minimal number of anys)
     \*/       (?# match the asterslash)
}{};
```

Still More Standard Modules

- Term::Cap - termcap
- Term::Complete - command completion
- Test::Harness - run regressions for extension
- Text::Abbrev - abbreviation expansion
- Text::ParseWords - split words like a shell
- Text::Soundex - the one and only
- Text::Tabs - translate tabs
- Time::Local - timelocal() and timegm()

Many others available from the net, including

- Tk
- DBI
- Curses
- Sx
- Msql

Yet More Standard Modules

- ExtUtils::MakeMaker - extension makefile maker
- File::Basename - portable filename manipulation
- File::CheckTree - verify permissions
- File::Find - walk the directory tree
- Getopt::Long - get long option names
- Getopt::Std - get short option names
- I18N::Collate - sort according to locale
- IPC::Open2 - open two pipes
- IPC::Open3 - open three pipes
- Math::BigFloat - arbitrary precision floating point
- Math::BigInt - arbitrary precision integers
- Math::Complex - complex arithmetic
- Net::Ping - routines to ping the net
- Search::Dict - binary search
- Sys::Hostname - get hostname somehow
- Sys::Syslog - log system messages

Other Standard Modules

- AutoLoader - standard autoloader base class
- Benchmark - run comparitive speed tests
- Carp - report errors outside of current package
- Config - access to all config.sh values
- Cwd - directory processing
- DynaLoader - the dynamic loader
- Env - make %ENV look like regular variables
- Exporter - base class for standard exporters
- Fcntl - common fcntl() definitions
- FileHandle - methods on filehandle objects
- NDBM_File - tie methods for NDBM
- ODBM_File - tie methods for ODBM
- POSIX - POSIX.1 functionality
- SDBM_File - tie methods for SDBM
- Shell - makes undefined functions call programs
- Socket - common socket() definitions

The English Module

@_	@ARG
$_	$ARG
$&	$MATCH
$`	$PREMATCH
$'	$POSTMATCH
$+	$LAST_PAREN_MATCH
$.	$INPUT_LINE_NUMBER
$.	$NR
$/	$INPUT_RECORD_SEPARATOR
$/	$RS
$|	$OUTPUT_AUTOFLUSH
$,	$OUTPUT_FIELD_SEPARATOR
$,	$OFS
$\	$OUTPUT_RECORD_SEPARATOR
$\	$ORS
$"	$LIST_SEPARATOR
$;	$SUBSCRIPT_SEPARATOR
$;	$SUBSEP
$?	$CHILD_ERROR
$!	$OS_ERROR
$@	$EVAL_ERROR
$%	$FORMAT_PAGE_NUMBER
$=	$FORMAT_LINES_PER_PAGE
$-	$FORMAT_LINES_LEFT
$~	$FORMAT_NAME
$^	$FORMAT_TOP_NAME
$:	$FORMAT_LINE_BREAK_CHARACTERS
$^L	$FORMAT_FORMFEED
$]	$PERL_VERSION
$^D	$DEBUGGING
$^I	$INPLACE_EDIT
$^T	$BASETIME
$^W	$WARNING
$^X	$EXECUTABLE_NAME
$<	$UID
$>	$EUID
$0	$PROGRAM_NAME

Importing

- **The short way:**

```
use Cwd;
```

- **The long way:**

```
BEGIN {
    require Cwd;
    import Cwd;
}
```

- **The short way with a list:**

```
use Cwd qw(getcwd chdir);
```

- **The long way with a list:**

```
BEGIN {
    require Cwd;
    import Cwd qw(getcwd chdir);
}
```

- **The same mechanism is used for “pragmas”**

```
use strict vars, subs, refs;
use integer;
no integer;
use less memory;
use sigtrap qw(ILL TRAP EMT FPE BUS SEGV);
```

Modules

```
package Cwd;
require 5.000;
require Exporter;

@ISA = qw(Exporter);
@EXPORT = qw(getcwd fastcwd);
@EXPORT_OK = qw(chdir);


# By Brandon S. Allbery
#
# Usage: $cwd = getcwd();

sub getcwd
{
    ...
}

sub fastcwd {
    ...
```

Objects

- **Object = Reference + Package**
- **Constructors create reference and then “bless” it**

```
sub new { return bless {NAME => FIDO}; }
```

- **Package has one destructor named DESTROY**

```
sub DESTROY {
    my $self = shift;
    print ”Dog $$self{NAME} died\n”;
}
```

- **Methods are ordinary subroutines with special first argument**

```
sub method {
    my $self = shift;
    ref $self eq DOG or die ”Type mismatch”;
```

- **Four ways to call a method**

```
DOG::method($object,@ARGS)
$object->method(@ARGS);
method $object @ARGS;
$object->CLASS::method(@ARGS);
```

- **Multiple Inheritance of methods via @ISA**

```
package DOG;
@ISA = qw(MAMMAL, ANIMAL, FRIEND);
```

References

- **Creating references from named objects**

```
$ref = \@array;
$sub = \&function;
$attrs = \%MYATTRS;
```

- **Creating references to anonymous objects**

```
$anonarray = [1,12,[57,42], ”hike”];
$anonhash = {FOO => BAR, ADAM => EVE, CHIP => DALE};
$anonsub = sub { print ”triggered\n” }
```

- **General dereferencing**

```
push(@{$anonarray}, ”crunch”);
print ${$anonhash}{”CHIP”};
```

- **Syntactic sugar**

```
@list = @$anonarray;
$$attrs{ID}++;
print ”The answer is: ”, $anonarray->[2]->[1];
$anonhash->{ADAM} = MADAM;
$count[$a]{$b}[$c] += 42;
```

- **Reference type function**

```
recurse($reference) if ref $reference;
ref($arg) eq HASH or die bad ”argument”;
```

BEGIN and END

- **Explicitly in some pseudo awk:**

```
#!/usr/bin/perl -nl

BEGIN {
    $accum = 0;
}

$accum += $_;

END {
    print $accum;
}
```

- **Implicitly in** `use POSIX qw(setlocale fcntl_h);`

```
BEGIN {
    require POSIX;
    import POSIX qw(setlocale fcntl_h);
}
```

Miscellaneous Perl 5 Stuff

- **Arrow as synonym for comma**

```
%day = (Sun => 0, Mon => 1, ...);

$childmess = mget(
        OC           => $oc,
        OI           => $oi,
        SCOPE        => $scope1,
        ATTR_ID_LIST => $no_attrs);
```

- **Functions as unary or list operators**

```
$age = -M($filename);
@foo = split /^#/, $bar, 3;
```

- **You can now return from an eval**

```
$prog = "return $a ? 1 : 2";
eval $prog;
```

- **Error propagation**

```
die if $@;
```

- **Lexical scoping**

```
my $var = shift;
```

New Operators

- **Ultra-low precedence logicals**

  ```
  and, or, xor, not
  ```

- **chomp($line)**
- **exists $hash{$key}**
- **tie/untie**
- **abs($num)**
- **chr($num)**
- **access to various internal functions**

  ```
  uc, ucfirst, lc, lcfirst
  quotemeta
  glob
  formline
  ```

- **qw(foo bar baz)**
- **bless($ref)**
- **pos($string)**
- **goto &subroutine;**

What's New

- Nearly a complete rewrite
- Usually 25-40% Faster
- Simpler grammar
- Much better diagnostics and docs
- Lexical scoping
- Arbitrarily nested data structures
- Anonymous data structures and functions
- Easy objected-oriented programming
- Modules
- External subroutines in C or C++ via XS
- Dynamic linking on many architectures
- Autoloading subroutines
- POSIX and other standard modules
- Improved configuration
- Package constructors and destructors
- Regular expression enhancements

Deprecations and Depreciations

- **Deprecated for “action at a distance”**
  - `vec() to enable bitwise ops`
  - `”@literal”`
  - `$*`
  - `$#`
  - `$[`
- **Deprecated syntax**
  - `do verb()`
  - `if BLOCK BLOCK`
- **Optionally deprecatable via compiler directive**
  - `Barewords`
  - `Symbolic references`
  - `Unqualified global variables`
- **Depreciations (a better way provided)**
  - `select(HANDLE)`
  - `Verb markers`
  - `’ as package prefix delimiter`
  - `Punctuation as variable names`

Perl 5: The Big Nouns

- Compatibility
- Extensibility
- Usability
- Reusability
- Readability
- Scalability
- Maintainability
- Portability
- Responsibility
- Embeddibility
- Respectability?

Natural Language Concepts

- Learn it once, use it many times
- Learn as you go
- Many acceptable levels of competence
- Multiple ways to say the same thing
- No shame in borrowing
- Indeterminate dimensionality
- Local ambiguity is okay
- Punctuation by prosody and inflection
- Disambiguation by number, case and word order
- Topicalization
- Discourse structure
- Pronominalization
- No theoretical axes to grind
- Style not enforced except by peer pressure
- Cooperative design
- “Inevitable” Divergence

Those Funny Symbols

$ = “the” (singular)

@ = “those” (plural)

% = “relationship”

& = “do”

* = “any sort of”

“No, no, hannie in foodie!”

English as She is Programmed

- **Familiar syntax**

```
redo LINE if $something_left;
chop $head if traitor();
$california or &bust;
do { this() } until $done;
```

- **Indirect objects**

```
give $DOG $bone;
```

- **Verbing nouns**

```
dog($dog)
```

- **Anything as a Boolean**

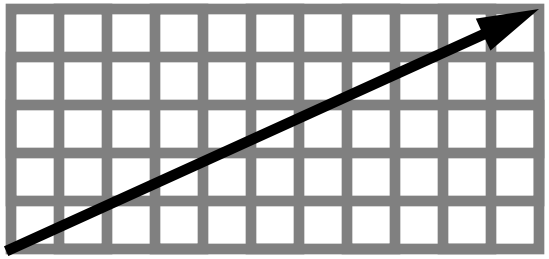
```
if (@foo)
if (grep(/^#/, @lines)
```

- **Aggressive tokenization**

```
/foo/ / /bar/ . .20 < <STDIN> % %bletch
```

How To Get There From Here

- **Diagonalization**



- **All you need to know is that...**

```
just_do_it()
```

- **Landmarks**

"I'll know it when I see it."

- **Geography vs. Orthography**

"Who put that mountain there during the night?"

- **Get a faster camel**

Visual Distinctions

- **You-pick-'em quotes**

```
s/foo/bar/, m//, tr///, q//, qq//, qx//
tr[a-z][A-Z]
line-oriented
```

- **Classes of operators**

```
== vs eq vs -e
```

- **Formats**

```
@<<<<<<<<<<<<< @|||||||||| @>>>>>>>>>>>>>
```

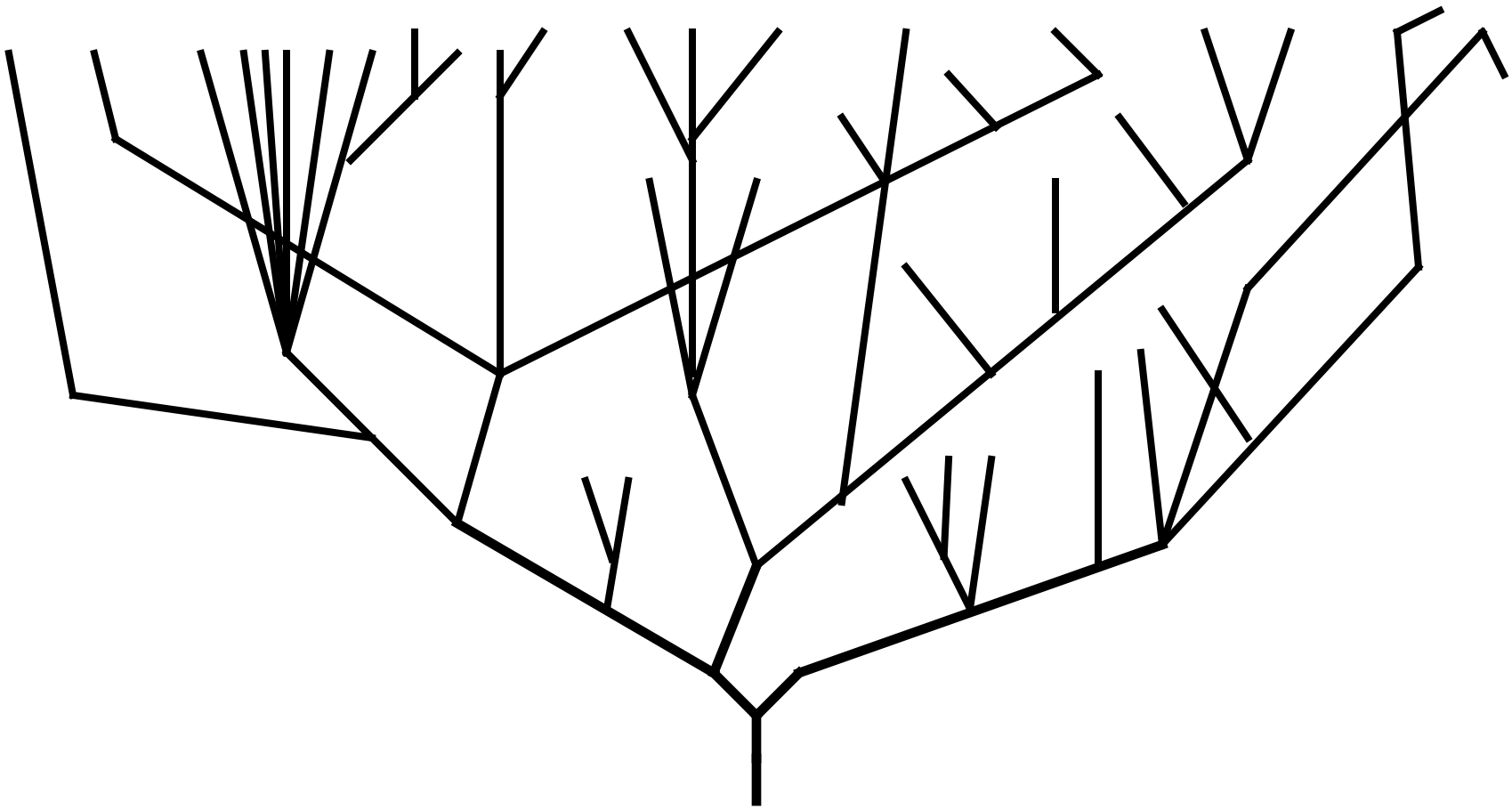
- **Types**

```
$foo @bar %baz *beep
```

- **Mumbles**

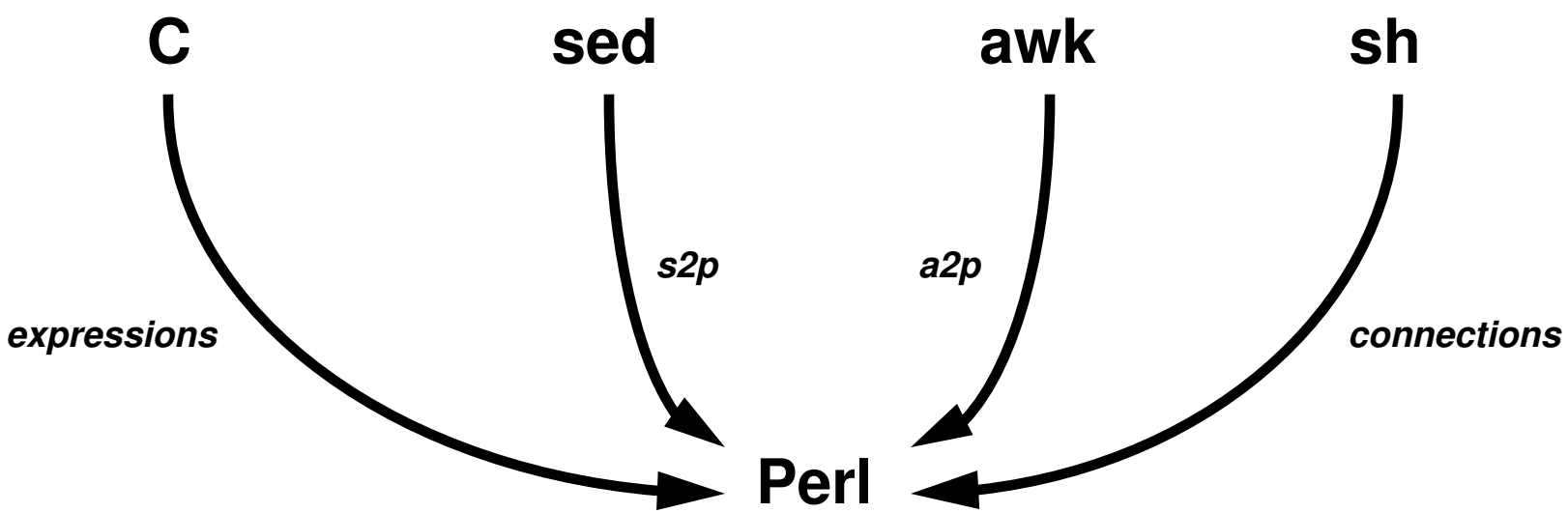
```
print "ENTERING FINAL PHASE!!!!\n" if $verbose;
open(HANDLE, "myfile") || die "Can't open: $!";
```

The *Other* Perl Family Tree



Perl

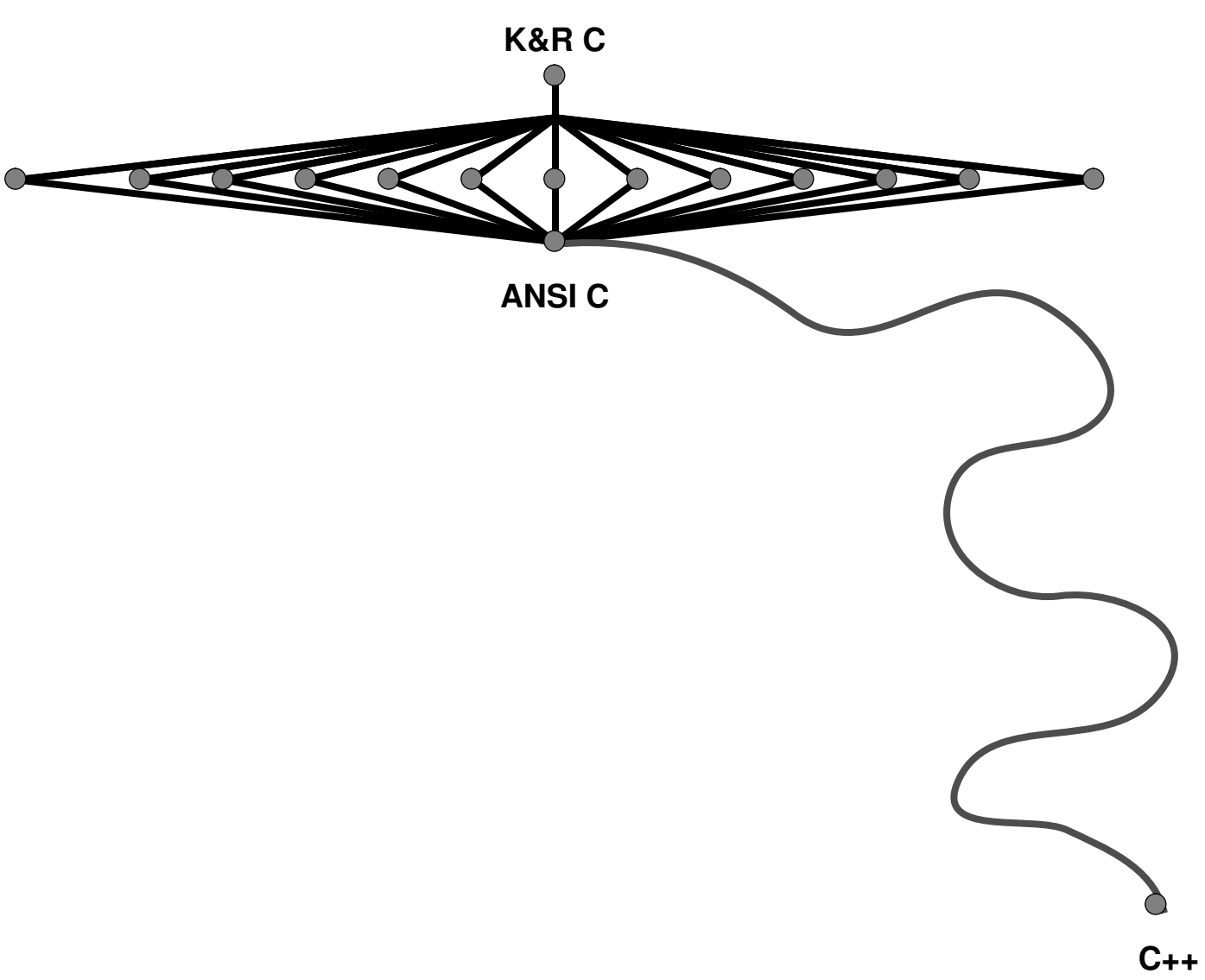
Easy Migration



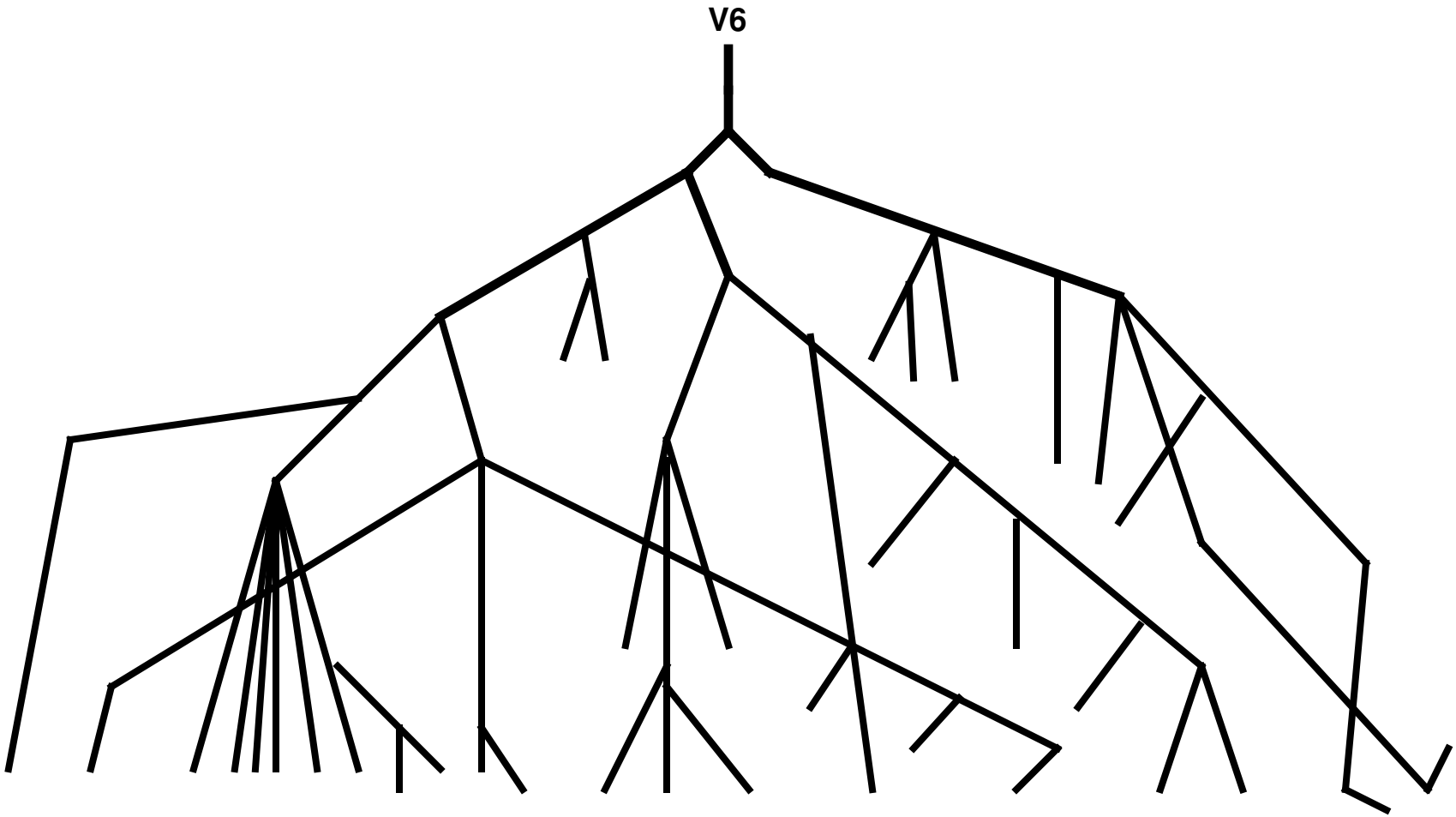
The Perl Family Tree

(under construction)

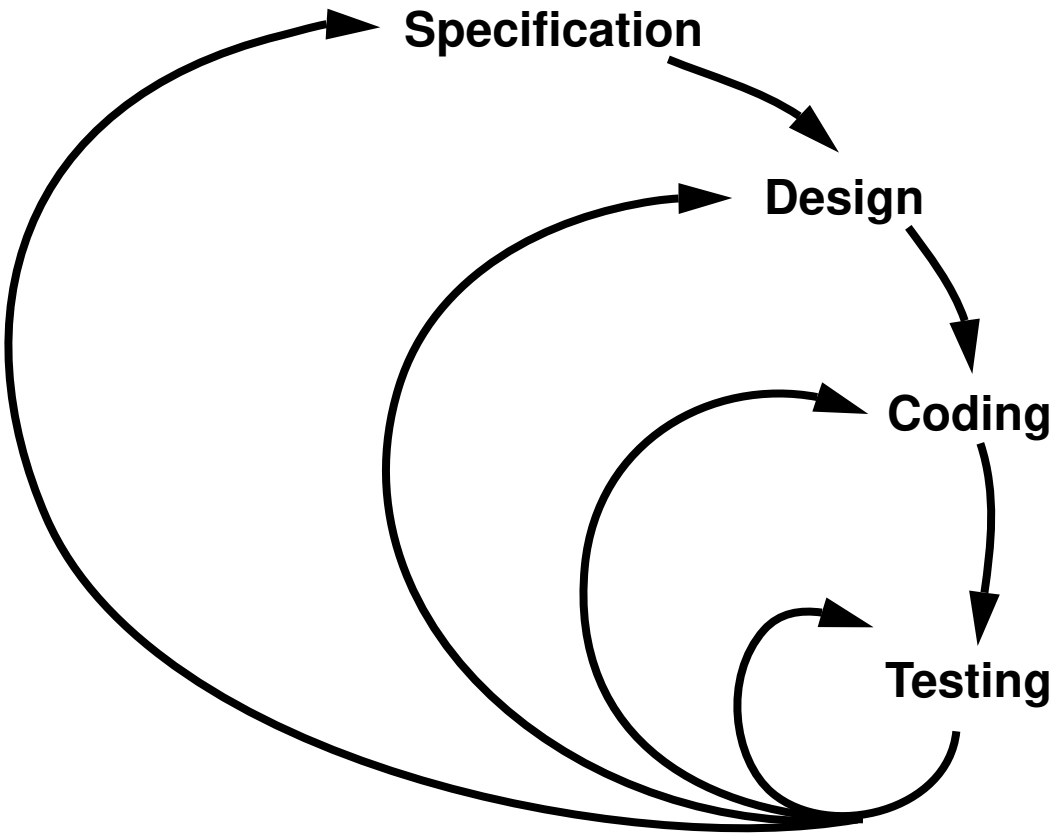
The C Family Tree



The Unix Family Tree



Waterfall or Whirlpool?



Larry's Conjecture

For most people, the perceived usefulness of a computer language is inversely proportional to the number of theoretical axes that the language attempts to grind.

Common Fallacies of Language Design

- "We need to start over from scratch."
- "If we put in English phrases, that makes it readable."
- "Simple languages produce simple solutions."
- "If I wanted it fast, I'd write it in C."
- "I thought of a way to do it, so it must be right."
- "This is a VHLL. Who cares about bits?"
- "You can do anything with NAND gates."
- "Users care about elegance."
- "The specification is good enough."
- "Abstraction equals Usability."
- "The common core should be as small as possible."
- "Let's make this easy for the computer."
- "Most programs are designed top down."
- "Text processing doesn't matter."
- "People should never have been given free will."

My Irrationalities

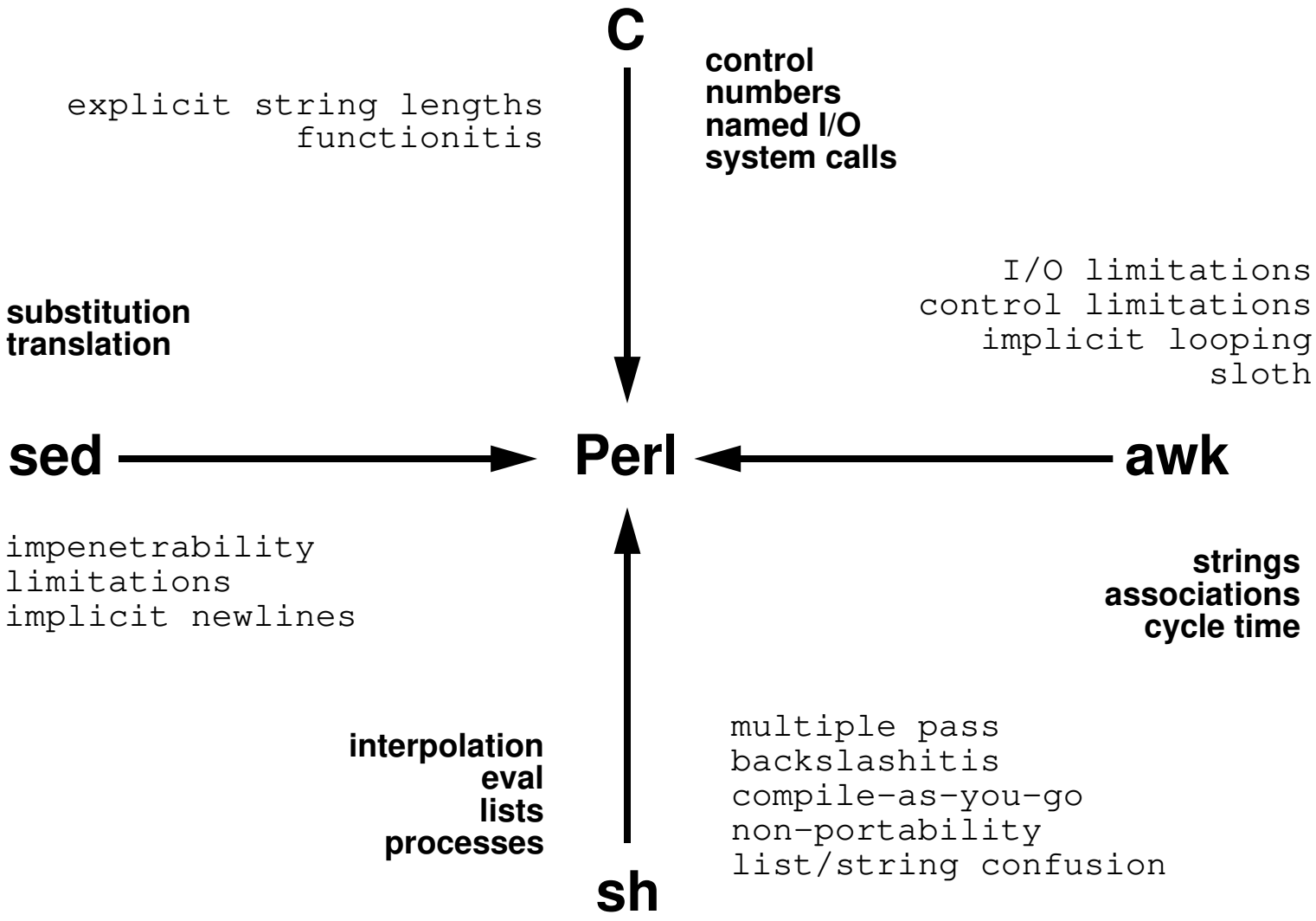
- Syntax shouldn't dangle in the wind
- Ordinary people like me hate abstraction
- C is wonderful
- C is awful
- awk is neither
- Language is an amoral medium
- Ugly can be beautiful
- Beautiful can get ugly real quick
- Visual metaphors are for more than just poetry
- I don't care what other people think
- I care what other people think
- I think God has free will

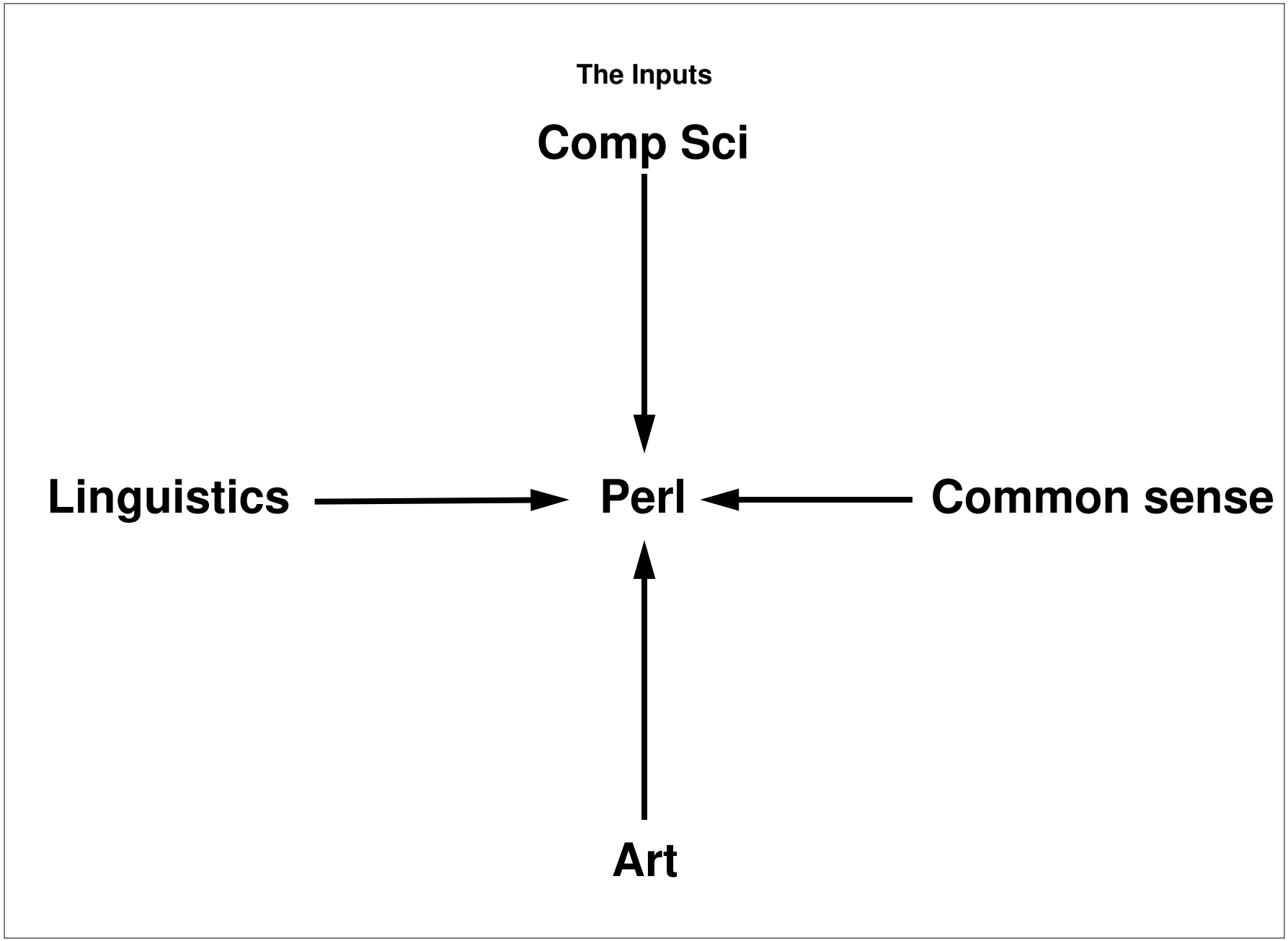
Bastardization

or

Hybrid Vigor?

What to Take, What to Leave Behind




The Inputs
Comp Sci
Linguistics
Perl
Common sense
Art

Humble (?) Beginnings

- **Scalars to Represent Values**

  To give Perl a good memory.

- **Filehandles to Represent Files**

  To give Perl good “legs”.

- **Regular Expressions for Extraction**

  To give Perl good “eyes”.

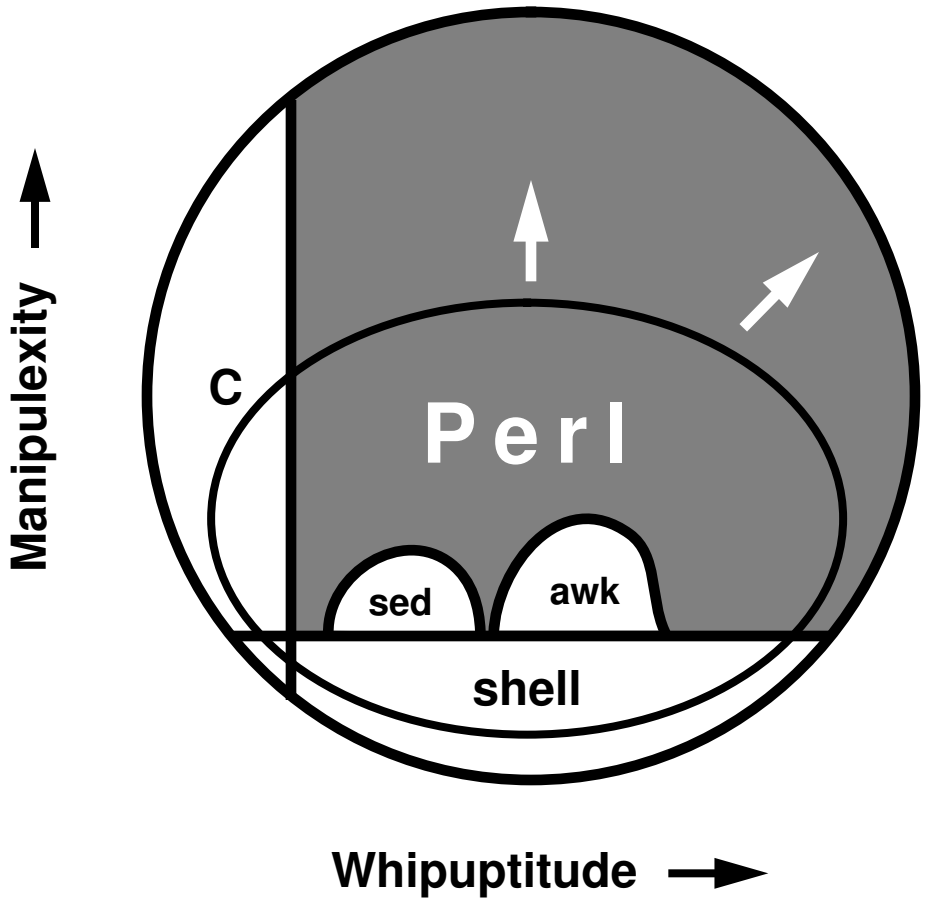
- **Literals that Allow Interpolation**

  For easy variable-width formatting.

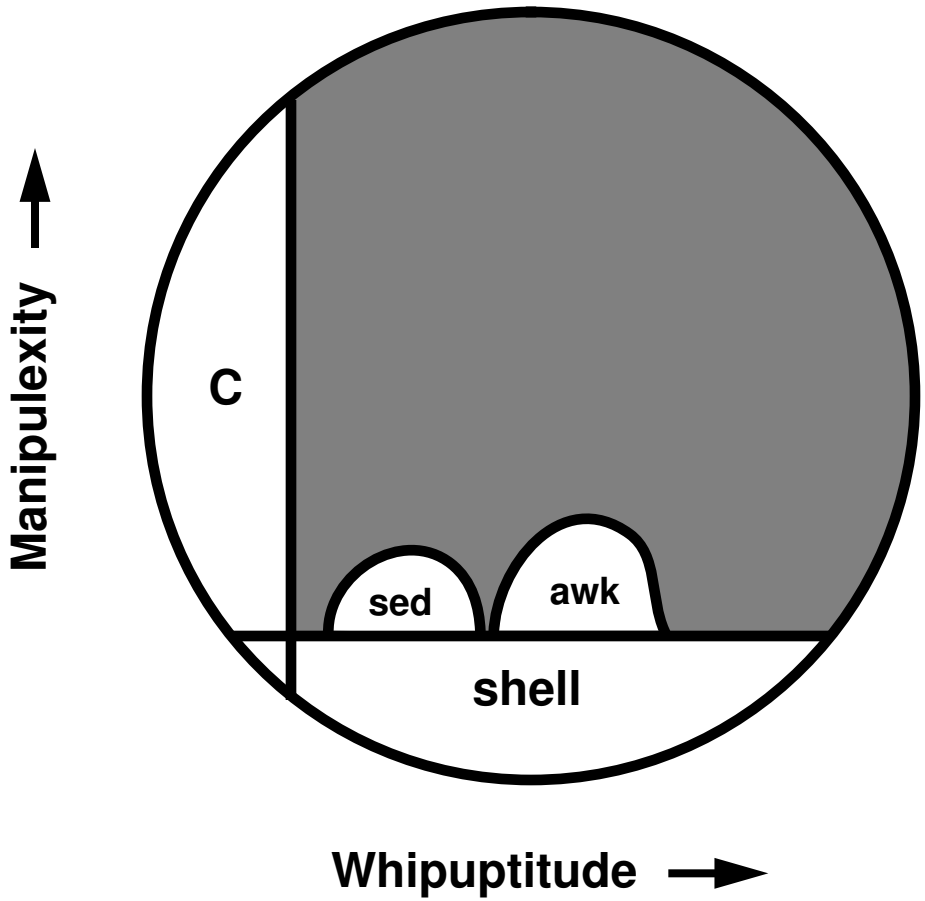
- **Formats for Reporting**

  For easy fixed-width formatting.

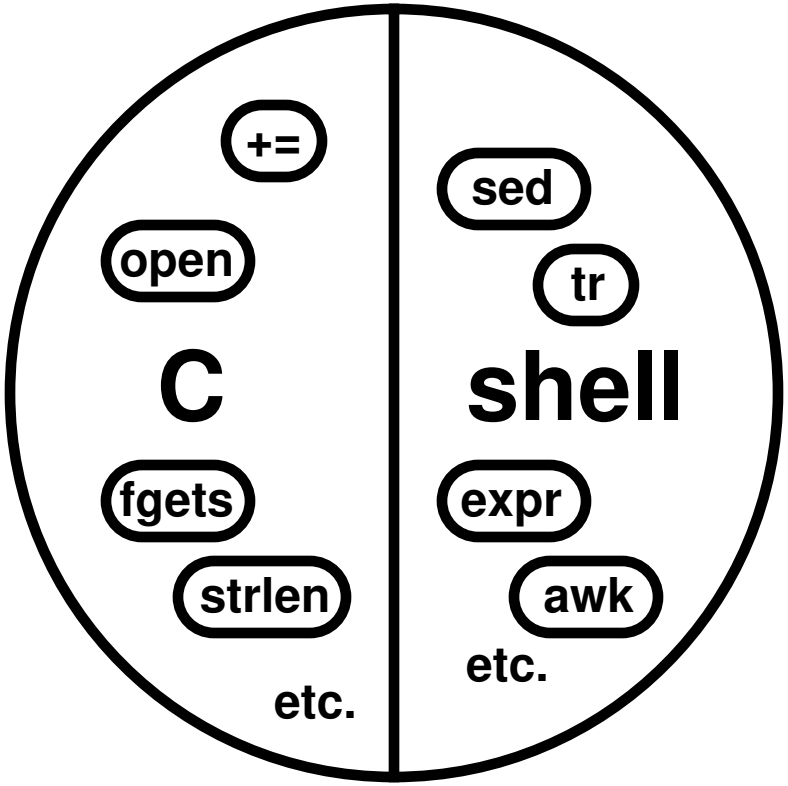
The Hatching of an Idea



How It Really Was Back Then



How It Was Back Then
(Sort Of)



The Taming of the Camel

An Overview of Perl 5.0

Larry Wall
<lwall@netlabs.com>

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