

# ChatScript Finaling a Bot Manual

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OK. You've written a bot. It sort of seems to work. Now, before releasing it, you should polish it. There are a bunch of tools to do this.

## Verification (:verify)

When I write a topic, before every rejoinder and every responder, I put a sample input comment. This has #! as a prefix. E.g.,

topic: ~mytopic (keyword)

t: This is my topic.

#! who cares

a: (who) I care.

#! do you love me

?: (do you love) Yes.

#! I hate food

s: (I \* ~hate \* food) Too bad.

This serves two functions. First, it makes it easy to read a topic-- you don't have to interpret pattern code to see what is intended. Second, it allows the system to verify your code in various ways. It is the “unit test” of a rule. If you've annotated your topics in this way, you can issue

<b>:verify</b>	– all topics, all ways but samples and gambits
<b>:verify ~topicname</b>	- named topic, all ways but samples and gambits
<b>:verify ~to*</b>	- all topics whose names start with ~to
<b>:verify keyword</b>	- all topics doing keyword verification
<b>:verify ~topic pattern</b>	- named topic, doing pattern verification
<b>:verify blocking</b>	- all topics doing blocking verification
<b>:verify sample</b>	- all topics doing sample verification
<b>:verify gambit</b>	- all topics doing gambit verification
<b>:verify all</b>	- all topics doing all verifications

Passing verification means that each topic is plausibly scripted. To be clear how valuable :verify is, consider this example. We authored a demo bot for a company and they added a bunch of code themselves. It was a 5500 rule bot. When I got around to verifying it, the results were: 57 keyword complaints, 92 pattern complaints, 45 blocking complaints, and (after fixing all those other complaints) 250 sampletopic complaints.

So, you should verify first and live test second. The :verify command takes the topic name first (and optional) and then a series of keywords about what to do.

*:verify keyword*

For responders, does the sample input have any keywords from the topic. If not, there may be an issue. Maybe the sample input has some obvious topic-related word in it, which should be added to the keywords list. Maybe it's a responder you only want matching if the user is in the current topic. E.g.,

```
#! Do you like swirl?  
?: ( swirl) I love raspberry swirl  
can match inside an ice cream topic but you don't want it to react to Does her dress swirl?.
```

Or maybe the sample input has no keywords but you do want it findable from outside (E.g., an idiom), so you have to make it happen. When a responder fails this test, you have to either add a keyword to the topic, revise the sample input, add an idiom entry to send you to this topic, or tell the system to ignore keyword testing on that input.

You can suppress keyword testing by augmenting the comment on the sample input with !K or marking the topic as a whole TOPIC\_NOKEYWORDS

```
#!K this is input that does not get keyword tested.
```

*:verify pattern*

For responders and rejoinders, the system takes the sample input and tests to see if the pattern of the following rule actually would match the given input. Failing to match means the rule is either not written correctly for what you want it to do or you wrote a bad sample input and need to change it. This test SHOULD NOT fail when you are done. Either your sample is bad, your pattern is bad, or ChatScript is bad.

Rules that need variables set certain ways can do variable assigns (\$) or ( \_ ) at the end of the comment. You can also have more than one verification input line before a rule.

```
#! I am male $gender = male  
#! I hate males $gender = male  
s: ($gender=male I * male) You are not my type
```

If you want to suppress testing, add !P to the comment.

```
#!P This doesn't get pattern testing.
```

If you want to suppress pattern and keyword testing, just use K and P in either order:

```
#!KP this gets neither testing.
```

You can also test that the input does not match the pattern by using #!R instead of #!, though unless you were writing engine diagnostic tests this would be worthless to you.

*:verify blocking*

Even if you can get into the topic from the outside and the pattern matches, perhaps some earlier rule in the topic can match and take control instead. This is called blocking. One normally tries to place more specific responders and rejoinders before more general ones. The below illustrates blocking for *are your parents alive?* The sentence will match the first rule before it ever reaches the second one.

```
#! do you love your parents
?: ( << you parent >>) I love my parents    *** this rule triggers by mistake
#! are your parents alive
?: ( << you parent alive >>) They are still living
```

The above can be fixed by reordering, but sometimes the fix is to clarify the pattern of the earlier rule.

```
#! do you love your parents
?: ( (![alive living dead] << you parent >>) I love my parents
#! are your parents alive
?: ( << you parent alive >>) They are still living
```

Sometimes you intend blocking to happen and you just tell the system not to worry about it using !B. Or you can have the entire topic ignored by the topic control

TOPIC\_NOBLOCKING.

```
#! do you enjoy salmon?
?: ( << you ~like salmon >>) I love salmon
#!!B do you relish salmon?
?: ( << you ~like salmon >>) I already told you I did.
```

The blocking test presumes you are within the topic and says nothing about whether the rule could be reached if you were outside the topic. That's the job of the keyword test. And it only looks at you sample input. Interpreting your pattern can be way too difficult.

If *:trace* has been set non-zero, then tracing will be turned off during verification, but any rules that fail pattern verification will be immediately be rerun with tracing on so you can see why it failed.

*:verify gambit*

One principle we follow in designing our bots is that if a user is asked a question in a gambit, the bot had better be able to answer that same question if asked of it. The gambit verification will read all your gambits and if it asks a question, will ask that question of your bot. To pass, the answer must come from that topic or leave the bot with that topic as the current topic.

You can stop a topic doing this by adding the flag TOPIC\_NOGAMBITS. There is no way to suppress an individual gambit, though clearly there are some questions that are

almost rhetorical and won't require your bot answer them. E.g., *Did you know that hawks fly faster than a model airplane?*

`:verify sampletopic & :verify sample`

Once you've cleaned up all the other verifications, you get to sample verification. It takes sample inputs of your responders and sees if the chatbot would end up at the corresponding rule if the user issued it from scratch. This means it would have to find the right topic and find the right rule. If it finds the right topic, it will usually pass if you have managed most of the blocking issues.

I start with `:verify sampletopic`, which only shows inputs that fail to reach the topic they came from. This is generally more serious. It may be perfectly acceptable that the input gets trapped in another topic. This sample result is merely advisory. But maybe the rule that trapped it should be moved into the tested topic. Or maybe its just fine. But if the output you got doesn't work for the input, you can go to the rule for the output you got and alter the pattern in some way that excludes it reacting inappropriately to the input.

Once that is cleaned up, `:verify sample` will include rules that fail to get back to the correct rule of the topic. Usually, if you've fixed blocking, this won't be a problem.

## Spelling

To insure the outputs don't have spelling errors, I do a `:build` like this:

`:build harry outputspell`

and then fix any spelling complaints that should be fixed.

## Sizing

We generally adhere to a tweet limit (140 characters) and run `:abstract 140` to warn us of lines that are longer.

## `:topicinfo ~topic how`

This displays all sorts of information about a topic including its keywords, how they overlap with other topics, what rules exist and whether they are erased or not. You either name the topic or you can just use `~`, which means the current rejoinder topic (if there is one). You can also wildcard the name like `~co*` to see all topics that start with `~co`.

If `how` is omitted, you get everything. You can restrict things with a collection of how keywords. These include “keys”, to display the keywords, “overlap” to display the overlap with other topics' keywords, “gambits”, “rejoinders”, “responders” or “all” to limit rules to some of those, “used” and “available” to see only those rules meeting that criteria.

Of particular importance in finalization is the key overlap map. Keyword overlap is particularly interesting. As you assign keywords to topics, at times you will probably get excessive. Some topics will share keywords with other topics. For some things, this is reasonable. “quark” is a fine keyword for a topic on cheese and one on astronomy. But odds are “family” is not a great keyword for a topic on money. Often an extraneous keyword won't really matter, but if the system is looking for a topic to gambit based on “family”, you really don't want it distracted by a faulty reference to money. That is, you want to know what keywords are shared across topics and then you can decide if that's appropriate. Sometimes you are told a word but don't see it in the topic keywords. Use `:up` on that word to see how it intersects.

I use `:topicinfo` keys to generate a map across all topics. I then read the first column list of keywords for each topic to see if they obviously should be in that topic or if they don't really strongly imply that topic. If not, I try to remove them from it. Sometimes when I look at the list of topics that a key overlaps with, I find multiple topics with similar ideas. Like a topic called `~cars` and one called `~automobiles`. Often they are candidates for merging the topics.

### **:abstract**

There are several useful `:abstract` calls to do during finalization.

`:abstract 100`

If you want to adjust output of yours that would be too long for something like a phone screen, you can ask `:abstract` to show you all rules whose output would likely exceed some limit (here 100). Without a topic name it does the entire system. With a topic name e.g., `:abstract 100 ~topicname`, it is restricted to that topic. You can also use a wildcard like `~top*` to do all topics with `~top` at the start of the name.

`:abstract censor ~mywords` will note all output which contains any words in `mywords`. Of course regular uses may also appear. The censor command looks for any words referred to by the concept given.

`:abstract spell` will examine the outputs of all topics (or topic given) to find words whose spelling might be faulty. It's not a guarantee it is, but it can warn you about potential mistakes.

### **Regression**

Having built a functioning chatbot with lots of topics, I like to insure I don't damage old material in the future, so I write a list of test questions or statements for each topic. I refer to this as validation. I start out as a fresh user and input my sample chat session. Once I can make a valid chat session that starts with a fresh user, I convert that into a regression file via:

```
:regress init user outputname
```

The user can be a full file name or just the name of a user whose log is in the USERS directory. The output name should be wherever you want to put the resulting regression file (e.g., TMP/regress.txt )

Thereafter, all you have to do (not from a server version) is

```
:regress outputname
```

And the system will retest your conversation. It will note any differences. If there are differences, maybe they are correct (you edited your code). The system will ask if you want to update your regression file, and if you answer “yes”, it will rewrite the file with the updated test results.