

## The Bayesian Singalong Book

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At the biennial international meetings on Bayesian statistics in Valencia, Spain and other beachfront locations as now selected by the International Society for Bayesian Analysis (ISBA), one of the most popular features (after the sun and the free wine) is the “cabaret” performance, which traditionally takes place on the last night following the conference dinner. Acts over the years have included jugglers, magicians, jokesters, and even the occasional male striptease (the now-infamous “Full Monty Carlo”). Still, the cornerstone of the cabaret has always been the singing of new and often humorous Bayes-related lyrics to popular songs, a practice dating to the landmark work of Box (1979; reprinted herein).

In this abbreviated collection, we present a few of the songs that have been performed at Bayesian cabarets over the years, emphasizing those that might make good singalong material for the audience at the Valencia 9 cabaret. For more complete information, visit [www.biostat.umn.edu/~brad/cabaret.html](http://www.biostat.umn.edu/~brad/cabaret.html).

### CONTENTS

#### The Songs

Bayeseamus Igitur (Dawid) . . . . .	2
Bayesian (Carlin) . . . . .	3
Bayesian Believer (Carlin) . . . . .	4
Bayesian Prison Blues (Carlin) . . . . .	5
Bayesian Wonderland (Ashih/Reutter) . . . . .	6
Bayesians in the Night (DeGroot/Natvig) . . . . .	7
I.S.B.A. (Wakefield/Stephens/Carlin) . . . . .	8
Imagine (Carlin/McCulloch) . . . . .	9
An MCMC Saga (Rosenthal) . . . . .	10
Prior (Glickman) . . . . .	11
The Simulator (Huber) . . . . .	12
Statistician (Weiss/Carlin) . . . . .	13
There’s No Theorem Like Bayes’ Theorem (Box) . . . . .	14
Voodoo Bayesian Child (Green) . . . . .	16

## Bayeseamus Igitur

Words: A.P. Dawid<sup>1</sup>

Music: medieval student drinking song

First performance: Valencia 3

- V1:** Let's have more fun while we can  
 Until the whole world's Bayesian!  
 Since our prior expectation  
 Of posterior location  
 In the limit's six feet down.
- V2:** We'll drink a toast to former days  
 When everyone loved Thomas Bayes.  
 Be he now in Heaven or El  
 Lobo's den let's wish him well:  
 Here's to what his Theorem says!
- V3:** If it's inference you desire  
 Make the toast, "Long live the prior!"  
 Set it up and hit it later  
 With the model and the data –  
 That's how Dennis could retire.
- V4:** Frequentists may spit and curse  
 But they're in for something worse:  
 To the depths of Hell so ample  
 May they take repeated sample  
 Theory with them in the hearse!
- V5:** Now Adrian will lead the cheer  
 And we'll toast "Valencia!"  
 Where Jose's inspired ambition  
 Sets the Bayesian position:  
 He's the reason why we're here.
- V6:** And so we'll raise another glass:  
 "More Bayesian Valencias!"  
 But Morrie's gaining weight in practice  
 For our last toast, which is in fact is  
 "To the days Bayes rules at last!"

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<sup>1</sup>being a loose translation, from the original Latin of Mammitzsch et al. (1987)

## Bayesian

Words: B. Carlin

Music: Olivia Newton-John (“Physical”)

First performance: ISBA 2008 (Hamilton Island, Australia)

**V1:** I know they taught you all about that Fisher man,  
and how to get the MLE,  
I wanna get you to see the light – you know what I mean,  
  
I poked a little fun at Neyman and Pearson, contrasting them  
with deFinetti,  
There’s nothin’ left to talk about, ‘less it’s – subjectivity!

**Chorus:** Let’s get Bayesian, Bayesian  
I wanna get Bayesian, let’s get into Bayesian,  
Show me your posterior, posterior – show me your posterior,  
  
Oh, let’s get Bayesian, Bayesian  
I wanna get Bayesian, let’s get into Bayesian,  
Let me see your DIC, DIC – let me see your DIC!

**V2:** I’ve been patient, I’ve been good, searchin’ for your prior feelings,  
  
You gotta know there’s no holdin’ back – you know what I mean,  
  
I’ll help you understand those convergence plots, and every model  
hierarchy,  
Your bimodality’s bringin’ out the analyst in me!

**Chorus:** (repeat)

**Solo:** (guitar? / chorus changes here still...)

**Chorus:** (repeat)

**Ending:** Oh, let’s get animal, animal  
– I wanna get animal, let’s get into animal  
Show me your posterior, posterior – show me your posterior....  
Show me your posterior – show me your posterior....

## Bayesian Believer

Words: B. Carlin

Music: Neil Diamond/The Monkees/Smashmouth (“I’m a Believer”)

First performance: Valencia 7

**Intro:** (key/guitar lick)

**V1:** I thought inference was just a fairy tale,  
 Confused by stats and probability,  
 Frequentist approaches (doo-doot doo-doot)  
 made no sense to me (doo-doot doo-doot)  
 Summarizing evidence by  $p$ ?!)

**Chorus:** Then I saw Tom Bayes – Now I’m a believer,  
 Without a trace – of doubt in my mind,  
 [I’m a] Bayesian (ooooh) – Oh, I’m a believer –  
 I couldn’t  $p$  now if I tried!

**V2:** I thought likelihood was just the only thing,  
 Turn the crank and get the MLE,  
 What’s the use of thinking (doo-doot doo-doot)  
 Disconnect your brain (doo-doot doo-doot)  
 Play along and minimize the pain...

**Chorus:** (repeat)

**Solo:** (keys/guitar)

**V3:** SAS was out to get me (doo-doot doo-doot)  
 (partial) – that’s the way it seemed (doo-doot doo-doot)  
 Fixed effects and forced normality...

**Chorus:** (repeat 2x w/assorted hollering and out!)

## Bayesian Prison Blues

Words: B. Carlin

Music: Johnny Cash (“Folsom Prison Blues”)<sup>2</sup>

First performance: Valencia 8

**Intro:** “Ciao, Io sono Giovanni Soldi...” (guitar lead)

**V1:** I hear the plane a comin’ – it’s flyin’ toward the beach,  
And I’ve got lots of sunshine, but the water’s out of reach,

I’m stuck in Bayesian Prison – and time keeps draggin’ on...

But that airplane keeps a’movin’ – on down to Ben-i-dorm!

**V2:** When I was back in grad school – my professor told me, please,  
Always use a Bayes factor – don’t ever play with  $p$ ’s,  
But that alpha-spending function really caught my eye....  
Now I’m lost and incoherent – and locked in here to die!

**Solo:** (guitar lead – Sooeey!)

**V3:** I can see those Bayesians standin’ ‘round some late-night poster  
session,  
Drinkin’ wine and talkin’ ‘bout some multi-stage regression,  
Well I know I had it comin’ – I know I can’t be free...  
But they’re samplin’ my posterior – and that’s what tortures me!

**Solo:** (guitar lead – Hidee-ho!)

**V4:** Well if they freed me from this prison, that would be my lucky day,  
I’d hit the conference dinner, then join the cabaret,  
Far from Bayesian Prison – that’s where I long to be...  
You could watch me runnin’ WinBUGS – and check my D-I-C!

**Outtro:**(guitar lick!)

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<sup>2</sup>English translation of Intro: “Hello, I’m Johnny Cash...”

## Bayesian Wonderland

Words: H. Ashih and R.A. Reutter  
 Music: D. Smith and F. Bernard (“Winter Wonderland”)  
 First performance: Valencia 6

**V1:** Glasses clink, are you listenin’?  
       Have a drink, [the] wine is glistenin’!  
 A beautiful sight, we’re tipsy tonight,  
       Stumblin’ through our Bayesian Wonderland.

**V2:** It’s a bad situation,  
       you get a fault of segmentation,  
 A long sleepless night, your program’s not right,  
       Strugglin’ with the Bayesian paradigm.

**Bridge 1:** In the theory we can build a sampler  
       With the jumps reversible in time,  
 But in practice it’s not quite that simple,  
       So conjugate analysis is fine!

**V3:** *P*-val’s stink, where’s your prior?  
       It can’t be flat, or you’re a liar,  
 Ask what is known, not what is shown,  
       To specify our Bayesian Wonderland!

*(potential solo break, over V1 and V2)*

**Bridge 2:** In the theory we can build a sampler,  
       With convergence surely guaranteed,  
 But beware of autocorrelations,  
       Or it will take forever to succeed!

**V4:** When it runs, ain’t it thrillin’,  
       To the last iteration,  
 It frolics and plays, throughout *n*-space,  
       Walkin’ in a Bayesian Wonderland.

**Ending:** Random walkin’ in a Bayesian Wonderland!

## Bayesians in the Night

Words: B. Natvig and M. DeGroot<sup>3</sup>

Music: Kaempfert/Singleton/Snyder (“Strangers in the Night”)

First performance: Valencia 3

- V1:** Bayesians in the night  
with exchangeable glances  
Assessing in the night  
the prior chances  
We’d be sharing risks  
before the night was through.
- V2:** Something in your prior  
was so exciting  
Something in your data  
was so inviting  
Something in my model  
told me I must have you.
- Bridge:** Bayesians in the night  
two statisticians  
We were Bayesians in the night  
Then came the moment when we walked down to the sea  
Under a fault tree  
Our likelihoods were close together  
and Sir Ronald lost his final feather
- V3:** And ever since that night  
we’ve been adherents  
Leaders of the fight  
to have coherence  
It turned out all right  
for Bayesians in the night.

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<sup>3</sup>original version by Natvig (1986) replaces the second part of the bridge with:  
“Until the moment that we’d said our first hello  
Little did we know  
Love was just a glance away  
and Sir Ronald never thought that way.”

**I.S.B.A.**

Words: J. Wakefield, D. Stephens, and B. Carlin

Music: The Village People (“Y.M.C.A.”)

First performance: Valencia 5; Second performance: ISBA 2000 (Crete)

**V1:** Bayesians – won’t you listen to me,  
           I said, Bayesians – find out what you can be,  
 So just come on – to the I.S.B.A.,  
           It will boost your career today!

Bayesians – do you want something more,  
           I said, Bayesians – is your research a bore,  
 Then just come on – to the I.S.B.A.,  
           Because they will take you anyway!

**Chorus 1:** It’s fun to be in the I.S.B.A – it’s fun to be in the I.S.B.A!  
 You can grease a few palms – go hunting for jobs,  
           You can suck up to all the knobs!

It’s fun to be in the I.S.B.A – it’s fun to be in the I.S.B.A!  
 You can work on your tan – you can swim in the sea,  
           You can hang out with Arnie Zee!

**V2:** ISBA – so the newsletter’s late,  
           But at ISBA – the food is just great,  
 And though we don’t know – where the meetings will be,  
           I’m sure they will work it out finally.

ISBA – the location is fine,  
           And at ISBA – there is lots of free wine,  
 We’ve got a journal – and though it’s fully online,  
           We still can’t seem to stay on time!

**Chorus 2:** It’s fun to be in the I.S.B.A – it’s fun to be in the I.S.B.A!  
 You can drink a few beers – go hunting for jobs,  
           You can suck up to all the knobs!

It’s fun to be in the I.S.B.A – it’s fun to be in the I.S.B.A!  
 You can work on your tan – you can go back to bed,  
           You can hang out with Arnie Zed!

(Repeat Chorus 1, and out)

## Imagine

Words: B. Carlin and R. McCulloch

Music: John Lennon (“Imagine”)

First performance: Valencia 4

- V1:** Imagine you’re a Bayesian–  
It’s easy if you try,  
You just adopt a prior,  
And the data updates  $\pi$ .  
Statistics is so simple  
With subjective probabilityyyyyy – ah-ah! ah ah...
- V2:** Now imagine you’re a frequentist,  
Worrying about what might have been,  
Spending your whole lifetime  
Analyzing data you’ve never seen.  
And if you want an interval,  
You’ll need a pivotal quantityyyyyy – ah-ah! ah ah...
- Chorus:** You may say I sound like a textbook –  
But I’m not the only one:  
Every four years we all get together,  
To talk, drink beer, and lie in the sun.
- V3:** We used to sweat computation –  
But MCMC took care of that,  
And if you want elicitation,  
Then Kadane et al. is where it’s at.  
And Jose and Jim talk reference priors –  
Building on work by Jeffreyyyyyys – ah-ah! ah ah...
- Chorus:** You may say, “He must’ve flunked out at Berkeley,”  
But you stick around and see,  
All the misguided will someday join us –  
And then the world will *finally* be free!

## An MCMC Saga

Words: J. Rosenthal

Music: Elvis Presley (“Jailhouse Rock”)

First performance: Valencia 7

Verse 1:

Had some data ready to inspect,

I modeled the relation as a random effect,

The number of parameters just grew and grew,

I had to get some help from you-know-who!

Chorus:

Run run -- Markov chain run,

Programming you was fun, but I’ll be happy when you’re done!

Verse 2:

I coded up a simple MCMC,

To do all the difficult work for me,

The sampler went funny and refused to mix,

Caused me a problem that I couldn’t fix!

Chorus: (repeat)

Solo 1: Harmonica (one verse)

Verse 3:

It seemed that my posterior required more,

A super-duper sampler it couldn’t ignore,

With Langevin, and tempering, a hybrid chain,

I had to tweak it again and again!

Chorus: (repeat)

Solo 2: Piano (two verses)

Verse 4:

I knew that my algorithm was no joke,

When my computer started spewing smoke,

My plan wasn’t working so I had to sub,

I drowned my MC sorrows at the local pub!

Chorus: (repeat twice and out)

## **Prior**

Words: M. Glickman

Music: Shocking Blue ("Venus")

First performance: MCMSki II (2008; Bormio, Italy)

Verse 1:

I had some extra information -- didn't know where it should go,

A method to express this knowledge -- is what I don't know...

Chorus:

I've got it -- yeah baby, I've got it!

Well, I'm the thesis -- I'm the prior that you require!

Well, I'm the thesis -- I'm the prior that you require!

(Guitar solo -- one verse)

Verse 2:

I had myself a complex model -- I didn't know how to constrain,

I tried to estimate the unknowns -- my attempts were in vain!

Chorus: (repeat)

Break

Half-verse: "Ahhhhh....."

Chorus: (repeat)

Break

Intro guitar riff to end

## The Simulator

Words: M. Huber

Music: Kenny Rogers ("The Gambler")

First performance: ISBA 2008 (Hamilton Island, Australia)

V1: On a warm summer's evening on a plane bound for ISBA,  
I met up with the simulator; we were both too tired to sleep,  
So we took turns a-staring out the window at the darkness,  
'Til the boredom overtook us, and he began to speak.

V2: He said,  
'Son, I've made a lifetime out of reading people's data,  
And knowing what the numbers tell, by the way the series lies,  
So if you don't mind my saying, I can see you're out of models,  
For a taste of your data, I'll give you some advice."

V3: So I handed him my laptop, and he downloaded my last file,  
Then he bummed a thumbdrive, and I watched its blinking light,  
And the night got deathly quiet, and his face lost all expression,  
Said, "If you're gonna run the chains, boy,  
ya gotta learn to do it right.

Chorus:

You got to know when to propose 'em, know when to reject 'em,  
Know when to stop a chain, and know when to run,  
You never find your error, while you're still collecting samples,  
There'll be time enough for error bars, when the chains are done.

V4: Every runner knows that the secret to chain burn-in,  
Is knowing what to throw away, and knowing what to keep,  
Because every run is perfect, and every run is worthless,  
And the best that you can hope for is results you can repeat.

V5: And when he'd finished speaking,  
he turned back towards the window,  
Closed down the black ThinkPad, and faded off to sleep,  
And somewhere in the darkness, his chain it reached convergence,  
But in his final words I found a trick that I could keep.

Chorus: (repeat and out!)

## Statistician

Words: R. Weiss and B. Carlin

Music: Roy Orbison ("Oh, Pretty Woman")

First performance: ISBA 2008 (Hamilton Island, Australia)

VERSE 1:

A F#m A  
Statistician, walking down the street -- Statistician,  
F#m  
D E the kind I like to meet,  
Statistician -- I don't believe you, you're not the truth,  
(Riff 2, 4x)  
No one computes as good as you -- Mercy!

VERSE 2:

Statistician, come on have some fun, Statistician, be a Bayesian,  
Statistician -- Your tests are lovely as can be,  
But not significant like me -- Rrrrowrrrr!.....

BRIDGE:

Dm G7 C Am  
Statistician, simulate -- Statistician, iterate,  
Dm G7 C  
Statistician, run it late for me  
Dm G7 C Am  
Statistician, yeah yeah yeah -- Statistician, think my way  
Dm G7 C A  
Statistician, integrate with me....  
F#m Dm E  
'Cause your data, it looks so right,  
A F#m Dm E (Riff 2, 4x)  
Come with me baby, run BUGS toni -- i -- ight!

V3: A F#m A F#m  
Statistician, don't maximize -- Statistician, try me on for size,  
D E  
Statistician -- Don't walk away, hey...  
E  
OK... your p is less than oh-five, OK...  
I guess I'll go on home, it's late,  
There'll be tomorrow night, but wait -- What do I see?....

Is she drifting back to me?...Yeah, she's converging back to me...

A  
Oh, oh, Statistician!

## There's No Theorem Like Bayes' Theorem

Words: G.E.P. Box

Music: Irving Berlin ("There's no Business like Show Business")

First performance: Valencia 1

**V1:** The model, the data you can't wait to see  
 The theta, beta, sigma, and the rho  
 The Normal, the Poisson, the Cauchy, the  $t$   
 The need to specify what you don't know  
 The likelihood for data you acquire  
 The perspicacious choosing of the prior

**Refrain:** There's no theorem like Bayes' theorem  
 Like no theorem we know  
 Everything about it is appealing  
 Everything about it is a wow  
 Let out all that a priori feeling  
 You've been concealing right up to now!

There's no people like Bayes people  
 All odd balls from the urn  
 The other day you thought that you had got it straight  
 Take my advice and don't celebrate  
 A paradox by Lindley could arrive quite late  
 Another Stone to unturn!

**Refrain:** There's no theorem like Bayes' theorem  
 Like no theorem we know  
 You can lose forever that perplexed look  
 If you start to study it right now  
 Even more enthralling than a sex book  
 You'll find that textbook by Box and Tiao!

There's no dogma like Bayes' dogma  
 It's great knowing you're right  
 We know of a fiducialist who knew the lot  
 We thought at first he had hit the spot  
 But after three more seminars we lost the plot  
 We just could not see the light!

**Refrain:** There's no theorem like Bayes' theorem  
 Like no theorem we know

Fisher felt its use was quite restricted  
Except in making family plans for mice  
But there, he said, for pinning down a zygote  
I'd give it my vote and not think twice!

There're no answers like Bayes' answers  
Transparent, clear and precise  
Stein's conundrums you can solve without a blink  
Best estimators in half a wink  
You can even understand what makes 'em shrink  
Their properties are so nice!

**V2:** There's Raiffa and Schlaifer, Mosteller & Pratt  
There's Geisser, Zellner, Novick, Hill and Tiao  
And these all are people who know what they're at  
They represent Statistics' finest flower  
And tho' on nothing else they could agree  
With us they'd join and sing in harmony!

**Refrain:** There's no theorem like Bayes' theorem  
Like no theorem we know  
Just recall what Pearson said to Neyman  
Emerging from a region of type B  
"It's difficult explaining to the Lehmann;  
I fear it lacks Bayes' simplicity!"

There's no haters like Bayes' haters  
They spit when they see a prior  
Be careful when you offer your posterior  
They'll try to kick it right through the door  
But turn the other cheek if it is not too sore  
Of error they may yet tire!

**Refrain:** There's no theorem like Bayes' theorem  
Like no theorem we know  
Critics carp at Bayes's hesitation  
Claiming that his doubts on what he'd done  
Led to late posthumous publication  
We will explain that to everyone:

When Bayes got up to Heaven  
He asked for an interview  
Jehovah quickly told him he had got it right  
Bayes popped down earthwards at dead of night  
His spectre ceded Richard Price the copyright  
It's very strange but it's true!!

## Voodoo Bayesian Child

Words: E. Green

Music: Willie Dixon/Muddy Waters ("Hoochie Coochie Man")

First performance: Valencia 9?

Verse 1:

Harold Jeffreys told my mother -- 'fore I was born,  
You got a Bayesian comin' -- gonna be a son of a gun,  
Gonna make all them frequentists -- stand up and shout,  
Then the world gonna know -- what Bayes all about!

Chorus:

But you know I'm here -- everybody knows I'm here,  
Well I'm the voodoo Bayesian child -- everybody knows I'm here!

Verse 2:

Got a prior and a likelihood -- got a posterior too,  
Got a full inference system -- I'm gonna slip it to you,  
Gonna make all my clients -- jump up and shout,  
Cause they'll finally understand -- what I'm talking 'bout!

Chorus: (repeat)

Verse 3:

Now we got our own journal -- and our own society,  
I think there's a secret handshake -- but no one's shown it to me,  
We can out-drink all others -- and still function at dawn,  
With a hundred versions of WinBUGS -- all our analytical  
problems are gone!

Chorus: (repeat)